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Wildlife Restoration Division

QUARTERLY REPORT

Not for Publication



Pittman-Robertson Federal Aid Projects

April - June 1954

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Table 7. Average Hog Dressed Weight of White-tailed Deer by Sex and Age Class - Fisher River-Wolf Creek Area, 1952 and 1953 Big Game Season

		1952									
Sex		Age Class by Years									
		$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{2}$	$8\frac{1}{2}-9\frac{1}{2}$	10+
Buck		51.0	104.5	120.1	135.7	162.5	170.0	185.0	177.5		
Sample		24	23	22	14	4	5	2	2		
Doe		50.6	90.3	96.7	98.8	92.5	108.3	101.3	103.6	86.4	87.5
Sample		27	27	20	4	2	4	4	5	7	4
		1953									
		$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{2}$	$8\frac{1}{2}-9\frac{1}{2}$	10+
Buck		58.5	100.3	128.1	157.7	171.2	169.7	174.3	169.5	182.0	175.5
Sample		40	49	19	7	10	4	3	2	1	2
Doe		54.7	85.7	101.7	102.3	100.5	109.1	105.5	109.2	102.6	102.8
Sample		31	22	27	13	2	8	4	4	7	10

Hunter Pattern: (Wolf Creek-Fisher River Area) During the first seventeen days of the big game season, October 15-31 inclusive (bucks only), 33.6 percent (590) of the total hunters took 9.8 percent (31) of the total deer kill, giving a hunter success of 5.3 percent. During the last 15 days, November 1-15, (either sex), 66.4 percent (1,165) of the total hunters took 90.2 percent (286) of the total deer kill, giving a hunter success of 24.6 percent. Note Figure VI.

On the first and last two days of the either sex season 32.2 percent (565) of the seasons hunters bagged 42.6 percent (135) of the total deer kill for the season.

Hunting conditions were improved during the last few days of the season, due to rainfall, which can partially account for the increased hunter pressure and kill.

Fluctuations of the buck-doe-fawn daily kill are shown in Figure VII which also indicates the peak days of harvest.

Figure VIII shows the cumulative deer kill in the Fisher River-Wolf Creek area and further indicates the relationship of deer harvested during the bucks-only and either sex seasons.

FIGURE VI.

HUNTING PRESSURE AND DEER KILL

1953 BIG GAME SEASON

FISHER RIVER - WOLF CREEK AREA

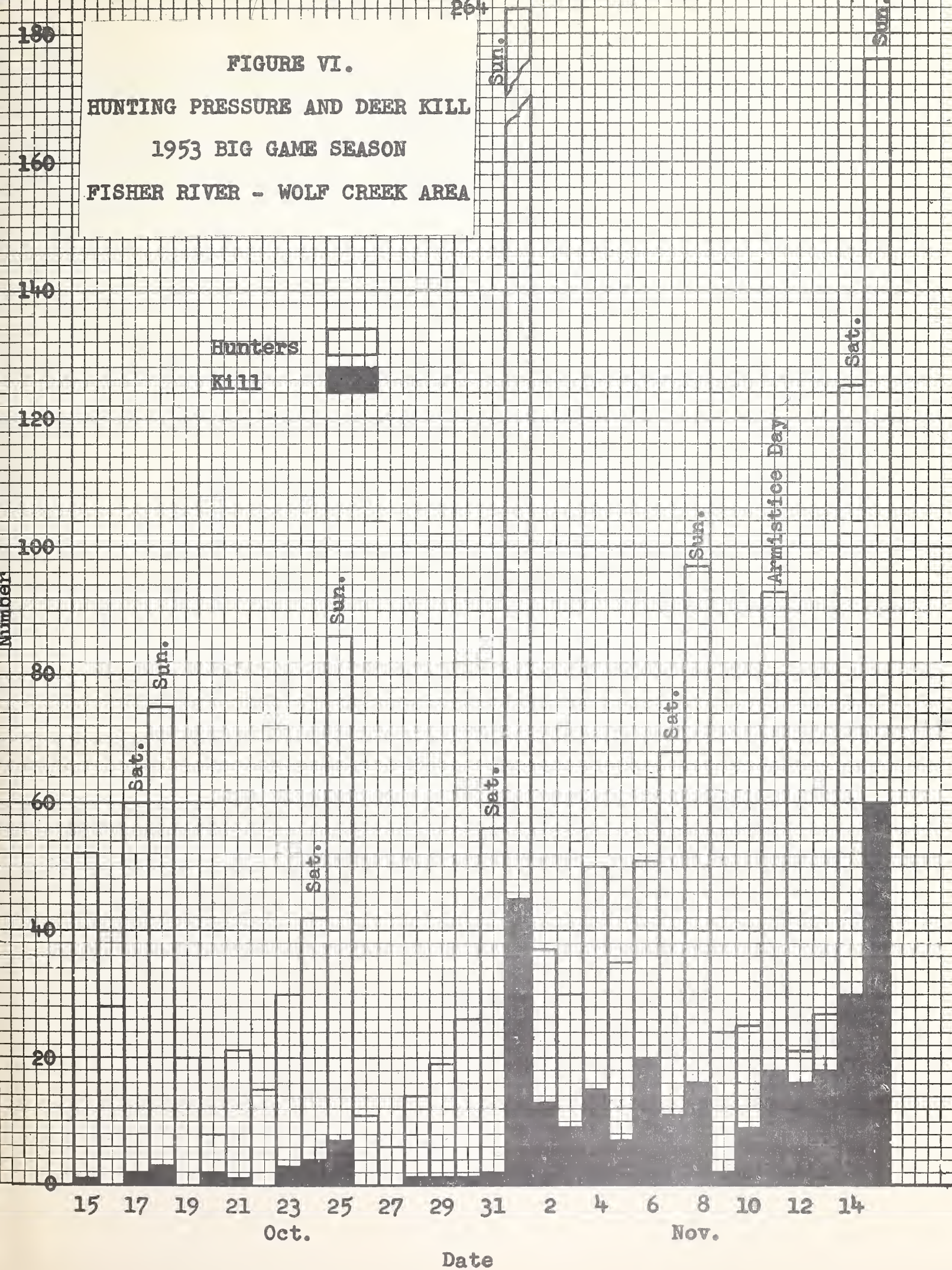
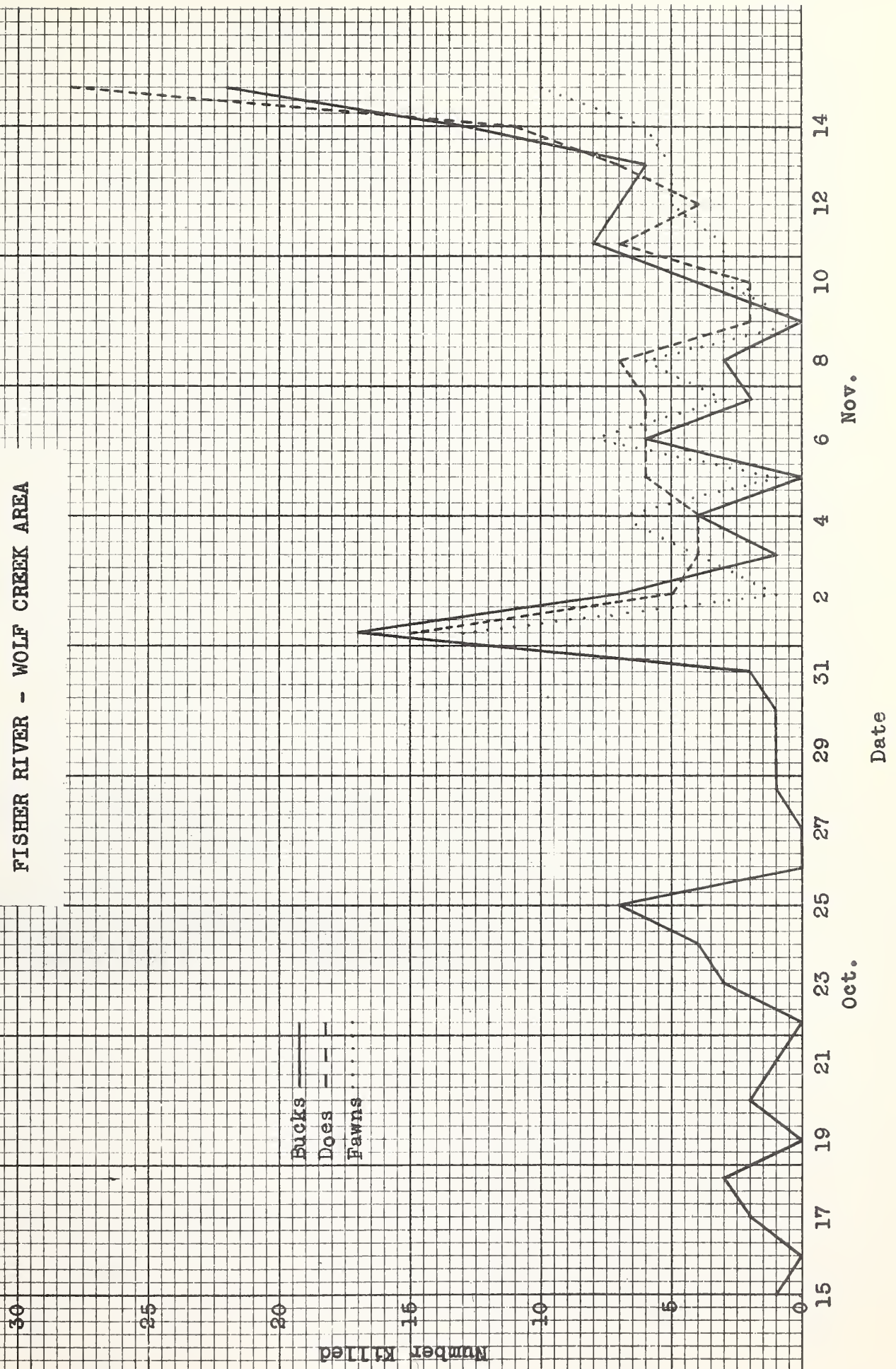


FIGURE VII.

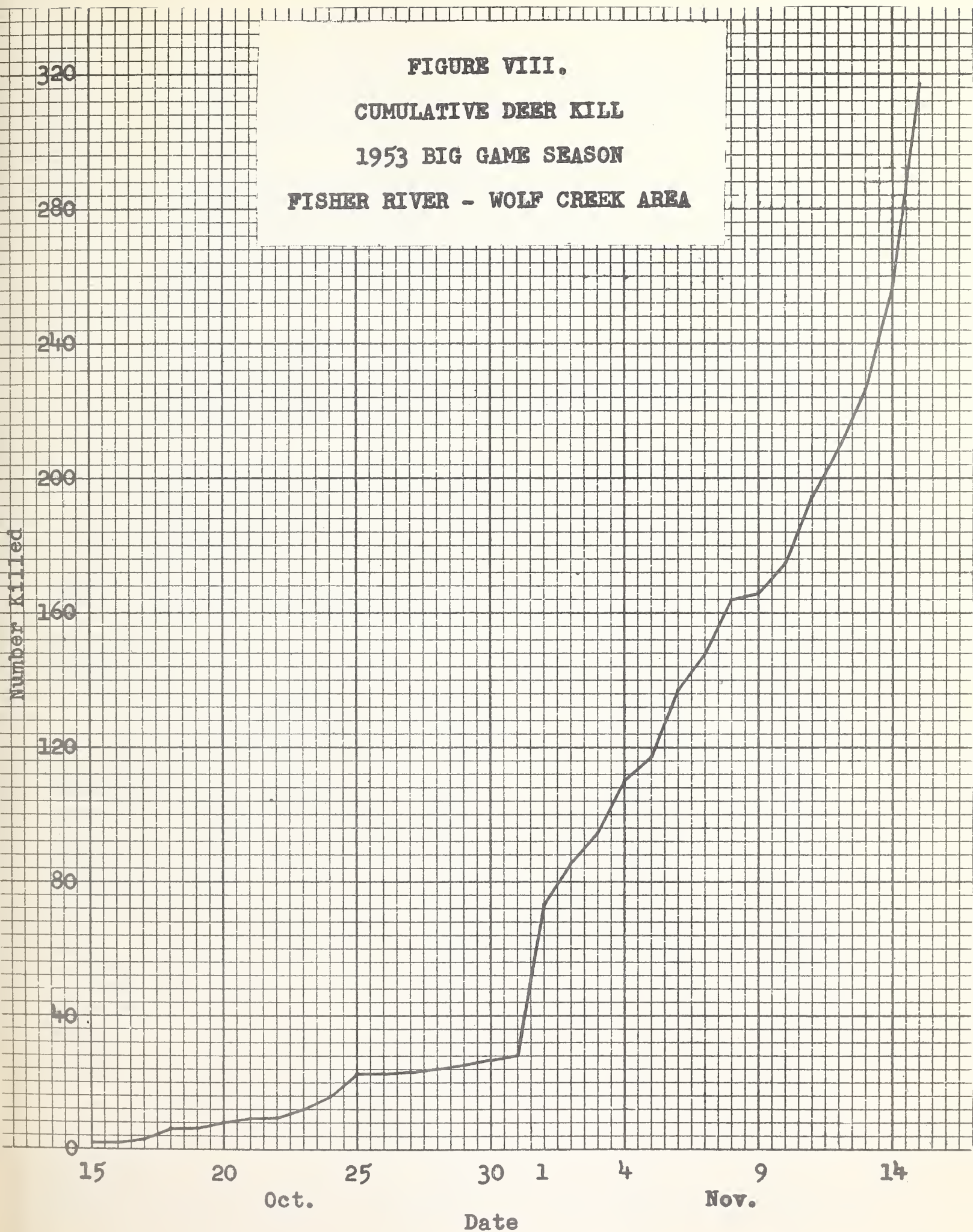
DAILY KILL OF DEER
1953 BIG GAME SEASON
FISHER RIVER - WOLF CREEK AREA





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FIGURE VIII.
CUMULATIVE DEER KILL
1953 BIG GAME SEASON
FISHER RIVER - WOLF CREEK AREA



Kill Location: The location of 302 kills, both white-tailed and mule deer, are plotted on Figure IX. The map is self-explanatory and indicates the number of animals taken within a few hundred yards of logging access roads.

Year by year road hunting is getting to be more of the hunter dispersal pattern; consequently climatic factors have a great deal to do with the volume of deer harvested. However, in many instances, the present day hunter is obligated to a working day, having a limited time in which to hunt. Knowing this they more readily take their chances of a kill by covering a greater area by road.

Source of Hunters: During the 1953 big game season 314 hunters from ten counties throughout Montana bagged their deer in the Fisher River-Wolf Creek area. Also three non-resident hunters from the State of Washington were successful.

Flathead County, as in the past, comprised the largest percentage of successful hunters, 42.9 percent. Lincoln County was second with 33.1 percent. Table 8 shows the source of successful hunters and percent of total for the Fisher River-Wolf Creek area during 1952 and 1953.

Table 8. Source of Successful Deer Hunters, Fisher River-Wolf Creek Area, 1952 Antlerless Season and 1953 Big Game Season

County	1952		1953	
	Number of Hunters	Percent of Total	Number of Hunters	Percent of Total
Flathead	125	47.0	136	42.9
Lincoln	40	15.0	105	33.1
Lake	39	14.6	33	10.4
Glacier	15	5.6	8	2.5
Pondera	10	3.8	10	3.2
Roosevelt	8	3.0		
Sanders	6	2.3	6	1.9
Hill	5	1.9	4	1.3
Toole	4	1.5	5	1.6
Cascade	1	0.4	3	0.9
Richland	1	0.4		
Chouteau	1	0.4		
Liberty	1	0.4		
Ravalli			1	0.3
Unknown	7	2.6	3	0.9
<hr/>				
State				
Washington	2	0.8	3	0.9
Nebraska	1	0.4		
Total	266	100.0	317	99.9

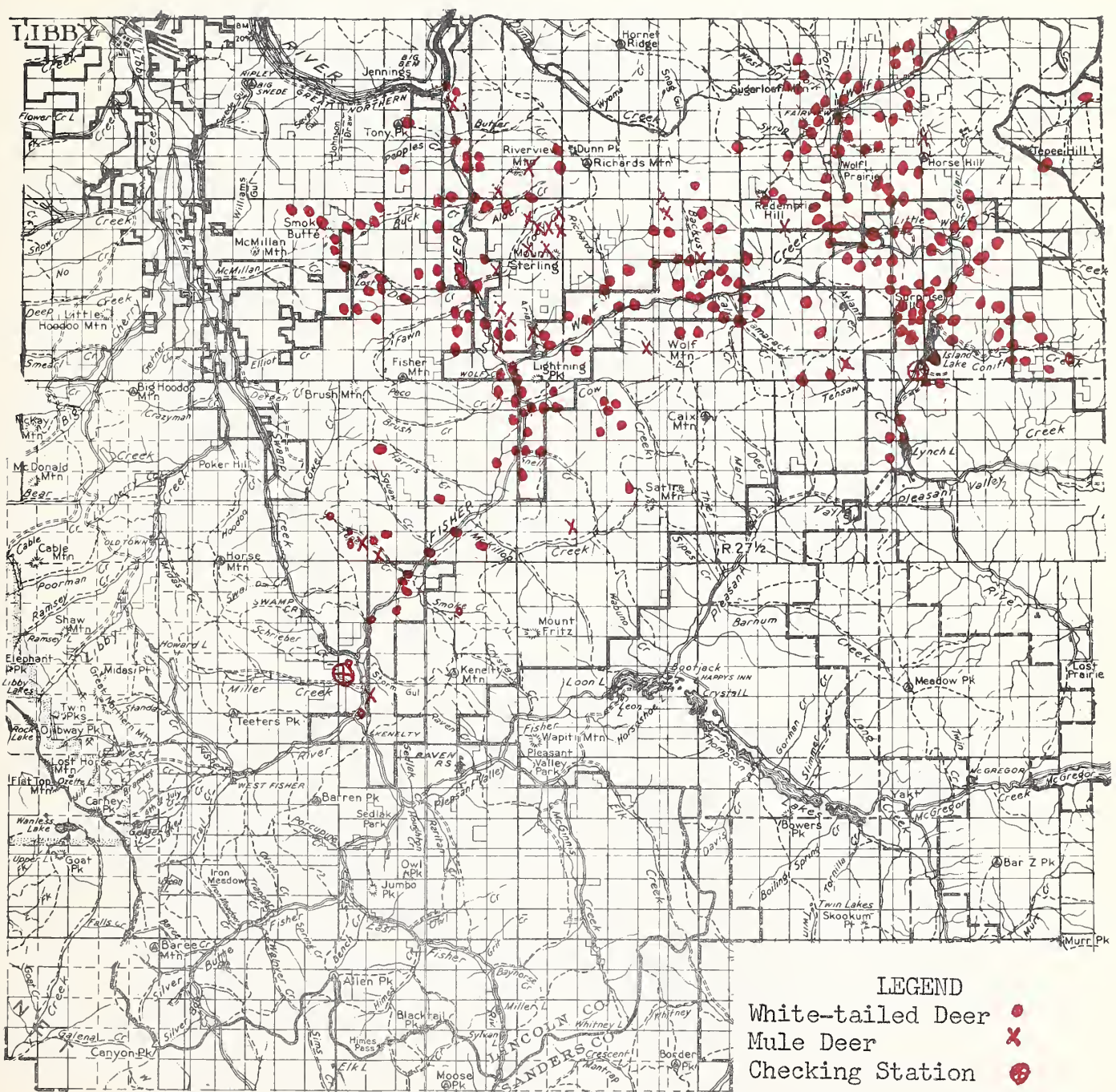


FIGURE IX

DEER KILL LOCATIONS

1953 BIG GAME SEASON

FISHER RIVER - WOLF CREEK AREA

There are indications of a decrease in out-of-county and non-resident hunters which can possibly be attributed to poor hunting conditions that have not warranted extensive travel. Other factors no doubt have a definite influence on this trend such as deer herd increases in other parts of this State as well as in other surrounding states, and hunting fees and regulations.

There are also indications that residents of Lincoln County are shifting their deer hunting efforts from other areas into the Fisher River-Wolf Creek drainages.

Conclusions: Fisher River-Wolf Creek Area

1. Mild weather conditions were conducive to a deficient deer harvest with respect to existing populations and winter range conditions.
2. One thousand, seven hundred and sixty-five deer hunters killed 284 white-tailed and 33 mule deer giving a hunter's success of 18.09 percent.
3. Periodic investigations have shown:
 - a. Continued increase of white-tailed deer beyond carrying capacity of the winter ranges
 - b. Continued over-utilization of winter ranges
 - c. Deficient annual deer harvest
4. Buck-doe-fawn kill ratio was 1.01:1.00:0.70
5. White-tailed deer made up 89.59 percent of the 1953 deer harvest. Legal bucks comprised 39.75 percent of the total deer kill, fawns excluded, or 45.74 percent of the kill with fawns included.
6. Eighty-three and five-tenths percent of the white-tailed deer were aged by the Severinghouse method. Seventy and eight-tenths percent were within the $1\frac{1}{2}$, $2\frac{1}{2}$, and $3\frac{1}{2}$ year age classes in 1953.
7. Ninety-three and three-tenths percent of the white-tailed deer killed were weighed. A slight over-all weight increase was noted by sex and age classes, attributed to the mild winter weather conditions of 1952-53.
8. It was found that mature white-tailed deer weight was reached between the ages of $2\frac{1}{2}$ and $3\frac{1}{2}$ for does and $3\frac{1}{2}$ and $4\frac{1}{2}$ for bucks, with no appreciable gain with age thereafter.
9. Thirty-three and six-tenths percent of the season's hunters killed 9.8 percent of the total deer kill during the bucks-only

portion of the season, leaving 66.4 percent of the hunters killing 90.2 percent of the total harvest during the either sex season.

10. On the first and last two days of the either sex season 32.2 percent of the season's hunters killed 42.6 percent of the total deer harvest.
11. Representatives from ten Montana counties and the State of Washington were successful in killing deer in the area. Flathead County comprised the largest number of successful hunters, 42.9 percent, with Lincoln County second, 33.1 percent.

Recommendations:

1. Under existing circumstances two big game checking stations can adequately sample the desired area. These stations should be confined to the Fisher River-Wolf Creek area with two men assigned to each.
2. Big game checking stations should be maintained only during the either sex season, except when special conditions warrant otherwise.
3. Special emphasis should be placed on obtaining female deer reproductive tracts for analysis.
4. A sound public information program should be continued to familiarize the sportsmen with checking stations and their biological purposes.
5. All checking station equipment should be furnished and maintained by the Montana Fish and Game Department.
6. Some means to facilitate increased deer harvest should be undertaken primarily in those areas sustaining deer herds that winter in the Fisher River-Wolf Creek area. The object is to alleviate the over-populated winter range problem.
7. Copies of the compiled report on the big game hunting season data should be made available locally to sportsmen groups and interested parties to acquaint them with the annual findings which they help to accumulate.

B. 1953 Deer Herd Composition Count

Introduction:

Prior to the establishment of sound management plans for any deer herd, it is essential to know the existing composition of the herd by sex and age class ratios. Theoretically, management should frequently compare the existing ratios with those desired and strive toward the latter.

The determination of an accurate herd ratio by sex and age classes is vested with many sources of possible error as found from numerous composition counts conducted throughout the various states. Past studies of other deer herds have shown that competent personnel have derived widely different buck:doe:fawn ratios from counts made of identical populations on identical areas but at different times of the day. In view of many such sources of possible error, every effort was made on the following study to adhere to consistent sampling techniques in order to obtain the most reliable data.

Objectives:

To determine the white-tailed and mule deer herd composition, in Lincoln County, by sexes and age classes with emphasis placed on those herds wintering in the Fisher River-Wolf Creek drainages.

Technique:

A desirable division of the county into units was obtained by adhering to Ranger Districts of the Kootenai National Forest. Within each of these districts important sampling areas were selected on the basis of known herd concentrations during the counting period.

The 1953 composition counts were confined to the following areas per Ranger District, from December 14 to 21 inclusive:

Troy District - December 14

Tepee Springs	Pine Creek Flats
Ferrel Creek	Callahan Creek
Sears Flats	Hale Creek

Warland District - December 15

Zeigler Mountain	Cripple Horse Creek
Ten Mile Creek	Lower Bristow Creek

Rexford District - December 16

Poverty Creek	Young Creek-Tooley Lake
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Ant Flats District - December 17

Deep Creek	Graves Creek
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Libby District - December 18 and 19

Horse Range

Swede Mountain

Raven District - December 20 and 21

Wolf Creek

Richards Creek

Ariana Creek

Lower Fisher River

Cody Creek

Cow Creek

Sylvanite District - No count made due to lack of suitable herd concentrations.

Sampling was achieved by a random coverage of each area with the cooperative assistance of the U. S. Forest Service, Kootenai National Forest. Personnel taking part in the count were as follows:

U. S. Forest Service:

Al Flint

George Holmes

Roy Lewis

Leo Starr

Robert A. Smart

Tom Farbo

Les Fulton

Robert VanGieson

Russell Cloninger

John Millogragovich

Skip Albert

Montana Fish and Game Department:

Bob Blair

Owen Wilson

Field counting was restricted to the hours between sunrise and midmorning and again from late afternoon to dark. It is during these hours that all classes of deer are moving about where they can be seen. Care was exercised in obtaining a representative sample of the over-all area to allow for a difference in local composition with changing elevation and cover type.

Many technicians suggest that complete counts of large groups are most desirable with respect to a true sample ratio. This was done whenever possible though it was found that, in general, the deer were not concentrated in any large numbers due to prevailing mild weather. Hence all animals were recorded in the sample regardless of group size, though emphasis was placed on securing complete and not partial counts.

The most reliable counts are made when deer are not aware of the observer as it is quite possible that the more wary animals slip away unobserved upon the approach of danger. It is also important that the observers be in the field for composition counts alone, rather than where the counts are incidental to other duties.

Many factors enter into the choice of the most suitable time .

of the year for making herd composition counts. The period of rut, when bucks are less wary, has generally been accepted as the ideal time to obtain a pre-winter count. Normally during the rutting period, deer are moving onto their winter ranges which permits more complete and easier sampling. However, prolongation of the counting period in expectation of greater herd concentrations with the onset of more severe winter climatic conditions can result in an improper ratio due to the shedding of antlers by bucks. From observations it was found that during the last day of counting, December 21, antler shedding had begun to occur, necessitating the termination of the sample.

All deer observed were recorded, on printed forms, by species and sex and classified into age groups of fawns or adults. No attempt was made to distinguish between yearlings and adults as the former were from 16 to 18 months of age at the time and virtually impossible to distinguish from the latter. This would result in a lower fawn: doe ratio due to the presence of yearling does which had not borne fawns the previous spring. In an attempt to rectify this error, the percentage of yearling does to adult does has been calculated on the basis of data collected by checking stations from the Fisher River-Wolf Creek area during the 1953 big game season. It was found that 23.47 percent of the white-tailed does harvested, excluding fawns, were yearlings. The yearling class of does could not be segregated for mule deer on the basis of hunter harvest data as this species was not aged by checking station personnel during the hunting season.

Findings:

Due to concentrated studies being conducted on deer herds wintering in the Fisher River-Wolf Creek area it was found desirable to calculate the herd composition ratio, by species, for both this area and for the county as a whole.

Fisher River-Wolf Creek Wintering Herd Composition (samples obtained from herds that migrate into this area to winter):

White-tailed deer:

588 - Total number of animals recorded in the sample

193 - Fawns

* 57 - Yearling Does (nonproductive during 1953 fawning)

186 - Does

69 - Bucks

83 - Unclassified

* 23.47 percent of does calculated as yearling animals on basis of 1953 hunter harvest data. It has been assumed that there was no hunter selectivity between $1\frac{1}{2}$ year old does and those above that age class.

Doe:Fawn Ratio = 1:1.04

Buck:Doe Ratio = 1:3.52

From a white-tailed deer census conducted in this area during the spring of 1954 the wintering population was determined as 10,917 animals. In applying the above buck:doe:fawn ratios to the existing population the following winter herd composition was resolved, prior to the partial population loss due to winter mortality:

4,173 Fawns (short yearlings, nonproductive for fawning in 1954)

5,253 Does (potentially capable of fawning in spring of 1954)

1,491 Bucks

10,917 Total white-tailed deer wintering population
(winter 1953-54)

Mule deer:

164 - Total number of animals recorded in the sample

32 - Fawns

76 - Does

51 - Bucks

5 - Unclassified

Doe:Fawn Ratio = 1:0.42 (inclusive of yearling does resulting in a low fawn:doe ratio)

Buck:Doe Ratio = 1:1.49

Lincoln County Herd Composition (including Fisher River-Wolf Creek area)

White-tailed deer:

756 - Total number of animals recorded in the sample

235 - Fawns

75 - Yearling Does (23.47 percent of does calculated as yearlings from hunter harvest in Fisher River-Wolf Creek area during 1953 big game season)

244 - Does (potentially productive)

102 - Bucks

100 - Unclassified

Doe:Fawn Ratio = 1:0.96

Buck:Doe Ratio = 1:3.13

Mule deer:

416 - Total number of animals recorded in the sample

101 - Fawns
182 - Does
114 - Bucks
19 - Unclassified

Doe:Fawn Ratio = 1:0.56 (inclusive of yearling does
resulting in a low fawn:doe
ratio)

Buck:Doe Ratio = 1:1.60

In the county-wide composition ratios of mule deer the same obscurity to the true fawn:doe ratio, with regard to nonsegregation of yearling does from those of older age classes, is present as in the Fisher River-Wolf Creek ratios.

1949 Deer Herd Composition Counts for Lincoln County

During December of 1949 composition counts were conducted in Lincoln County with the following results:

White-tailed deer:

Doe:Fawn Ratio = 1:0.40
Buck:Doe Ratio = 1:4.19

Mule deer:

Doe:Fawn Ratio = 1:0.50
Buck:Doe Ratio = 1:2.65

In the reporting of these ratios it was stated that not only was the weather poor for counting but also too few deer were seen to obtain a representative sample. The total number of deer recorded was: white-tailed - 289, and mule deer - 53. Another factor to consider when comparing the resulting ratios of 1949 with those of 1953 is that yearling does were not segregated for either white-tailed or mule deer in 1949 while this segregation was made with white-tailed deer in 1953.

On the basis of these facts it is not possible to accurately compare the ratios of the two years in question.

Conclusions:

1. Division of Lincoln County into sampling units for deer herd composition counts was made by Ranger Districts of the Kootenai National Forest. Sampling areas within each unit were chosen on the basis of deer concentration.
2. Field counting was restricted to hours between sunrise and midmorning and again from late afternoon to dark.
3. Emphasis was placed on obtaining complete animal group counts.

4. All deer were recorded by species and sex, and classified into age groups of fawns or adults.
5. Composition ratios were calculated by species for the county as a whole and also for the herds that winter in the Fisher River-Wolf Creek drainages.
6. To allow for the presence of the yearling class of does (nonproductive during the previous fawning season) in determining the fawn:doe ratio a percentage figure of $1\frac{1}{2}$ year old does to those of older age classes was derived from hunter harvest data taken by checking stations during the 1953 big game season in the Fisher River-Wolf Creek area. This percentage as determined for white-tailed deer only was found to be 23.47 percent.
7. Composition ratios for deer herds wintering in the Fisher River-Wolf Creek area:

White-tailed deer

Doe:Fawn :: 1:1.04
Buck:Doe :: 1:3.52

Mule deer

Doe:Fawn :: 1:0.42 (inclusive of yearling does)
Buck:Doe :: 1:1.49

8. Population composition for white-tailed deer herds that wintered (1953-54) in the Fisher River-Wolf Creek area, as determined from buck:doe:fawn ratios taken in December 1953):

4,173 Fawns (short yearlings, nonproductive for fawning in 1954)
5,253 Does (potentially capable of fawning in spring of 1954)
1,491 Bucks
10,917 Total white-tailed deer wintering population (winter 1953-54)

9. Composition ratios for deer herds in Lincoln County.

White-tailed deer

Doe:Fawn :: 1:0.96
Buck:Doe :: 1:3.13

Mule deer

Doe:Fawn :: 1:0.56 (inclusive of yearling does)
Buck:Doe :: 1:1.60

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Schmautz, Jack E., and Ade Zajanc

1950 Final Progress Report.

Montana Fish and Game Commission Quarterly Report

April-June, p.69

Anonymous

1951 Deer Herd Composition Counts

Deer Management Handbook

California Department of Fish and Game Sec. I, pp.23-27.

Prepared by:

Approved by:

Name Robert M. Blair

Montana State Department of Fish and Game

and Owen A. Wilson

By Faye M. Couey, Assistant Director

Date July 15, 1954

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-36-R-4
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report

Job No. IX-A

Investigations Project

Title of Job: Relationship of Other Wildlife to White-tailed Deer

WHITE-TAILED DEER WINTER RANGE DETERMINATION

Fisher River-Wolf Creek Area

Objectives:

To determine the limits of the winter range utilized by white-tailed deer in the Fisher River-Wolf Creek area during severe or critical winter periods in relation to that utilized during average or normal winter periods.

Technique:

Daily observations of deer activity were made throughout the area during a critical period of excessive snow depth and low temperatures from January to late February, 1954.

The extremities of the critical range were plotted in the field in accordance with known land marks such as roads and trails. This data was later transferred to a scaled map and planimetered for acreage determination.

Findings:

Reference is made to the attached map denoting white-tailed deer winter range in the Fisher River-Wolf Creek area. During relatively open or normal winters, deer utilize approximately 26,343 acres of winter range consisting of stream bottoms, benches, and south and west exposed slopes (limits determined by Schmautz and Zajanc from 1948 to 1951). With the onset of severe periods of deep snow the herds are forced off the slopes and compelled to restrict their range to the stream bottoms and lower benches consisting of 9,301 acres. Even here animal mobility is greatly inhibited, often confined to movement on the river ice.

Application of the 1953-54 wintering deer population (10,917 white-tailed deer) to 9,301 acres of critical range area shows that during the severe weather each acre supported 1.17 deer. It can readily be seen that if such conditions are prolonged for a lengthy period, the result to a white-tailed deer herd can be devastating.

Prepared by:

Name Robert M. Blair

and Owen A. Wilson

Date July 15, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-37-R-5
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Game Range Predevelopment Survey

Leader: Richard L. Hodder

Annual Job Completion Report

Investigations Project

Work Plan I: Gallatin Winter Elk Range

Job I-A: Range (Forage Inventory) Survey

Considerable time has been spent in going over the Gallatin Elk Winter Range Survey and map with the U. S. Forest Service to assure common interpretations. General application of the data has been postponed pending this review.

There is one last phase of this job which has delayed the completion of this work over an extended period--that phase is the final determination of carrying capacity for elk by a means or method suitable and acceptable to all concerned. A technique was developed and tested last fall on the Sun River Game Range that has apparently proved highly successful in overcoming those objections and disadvantages of other systems of determining carrying capacity. This technique tested last year for use on the Gallatin this coming fall is systematic sampling of the many vegetative types that compose a given range for dry weight of forage produced per acre, totalling these weights of forage and subtracting nonavailable and nonusable weights from the total. By dividing the total pounds of dry feed available on the range by the forage requirement of the class of stock concerned, which in this case of course is elk, and which has been determined over a period of three years from the Forage Evaluation and Nutrition Study carried on at the Blackfoot-Clearwater Game Range at Ovando, the carrying capacity for the area is determined.

Sampling of the Gallatin Range for dry weight of forage produced per acre is scheduled to take place this fall after growth of the native grasses and shrubs is completed for the year. This process should not be too lengthy, for the experience obtained last fall on the Sun River Game Range should eliminate much unnecessary time-consuming clipping which only raises limits of confidences and reliability of sampling beyond the limits of practical managerial ability.

Job I-B: Forage Production and Utilization Transects

Production-Utilization transects have been maintained on the Gallatin Elk Winter Range since the fall of 1948. Much data has been accumulated during these years in both spring and fall. The figures of the first five years have been compiled and have been examined by the Northern Rocky Mountain Forest and Range Experiment Station in Missoula for their reliability in sampling the Gallatin range, for judging their value and worth in representing production and utilization of forage produced at specific sites, and for indicating the trend of vegetational succession taking place on these areas. The analysis indicated that the study has proved sound for the Gallatin Unit as a whole, but it was judged inadequate, because of lack of duplication, to tell the utilization story on individual drainages within the Gallatin Unit. The sampling method was judged satisfactory for the purpose originally intended on the specific sites where transects are located. It was suggested that at the end of this five-year interval, several changes be made in the sampling technique that might correct the short-comings and weaknesses of the original method. It was suggested that a system of composite sampling of each transect be used now that the individual sampling which has gone on for years has proved that composite sampling would be sound. Another change suggested in the sampling technique was accepted and put into practice. Instead of taking samples at twenty-foot intervals along a transect line, samples are now being taken at random along or adjacent to the original transect line. Data will be accumulated as in the past on forage production by clipping in the fall, and on utilization of forage by elk by clipping in the spring.

Data accumulated over the last five-year period is in the process of being arranged for presentation this fall at the Upper Gallatin Conservation Committee meeting. Present data and charts show that production through the years has been relatively consistent while utilization has been extremely variable due to the differences in snow depths on the various portions of the range. For instance, during the most severe winter of the study period, 1951-52, the pattern of forage use was such as to show that next to the least use of forage in the whole five-year period was made on the most severe sites where heaviest use would be expected. A composite picture of all production-utilization transects charts over the five-year period show that 59% of the vegetation produced on these sites studied was used by elk. It seems apparent at present that variables are so extreme that five years of data on production and utilization of forage

are insufficient to make any worthwhile or significant indication of direction of the vegetative trend on this important range.

Job I-C: Browse Withstandability Tests

A final report on a five year study of browse withstandability in the Porcupine area has been submitted. Linear measurement of marked browse plants in the Taylor Fork drainage is being maintained each fall and spring. New shrubs have been selected and marked to replace those bushes that have died.

Job I-D: Photo-plot Transects (Trend Study)

Annual fall pictures were taken of the photo-plot transects on the Gallatin Unit with the newly acquired 4 x 5 Graphlex camera. These pictures that have been taken each fall since 1950 have been mounted in chronological series on masonite board so that a permanent visual record is available of the changes in the vegetation in the plots through the last four years. Space has been reserved for the remaining pictures which will complete a five-year series on each board.

Job I-E: Forage Revegetation Studies

A. Grass Revegetation

Inspection of grass reseeding trials shows that all have been unsuccessful with the exception of one plot. The primary factor causing these consistent negative results is the unusually high ground squirrel and pocket gopher population in the areas of study. The one exception noted above was a slender wheatgrass plot located high on the side of Lincoln Mountain in heavy clay soil. Few ground squirrels seem to frequent this area.

Because it is so unlikely that the rodent population will be reduced in the near future, grass revegetation experiments were carried on during the last year stressing the use of grass rhizomes and clones as propagation material instead of direct seeding. Several species were tried, among them being sand reedgrass (Calamovilfa longifolia), saltgrass (Distichlis stricta), quackgrass (Agropyron repens), and Siberian wild-rye (Elymus giganteus).

These grasses have not been planted for a sufficient length of time to offer significant results. Results on one species were immediately apparent however, for the saltgrass rhizomes planted in alkaline clay on hillsides were immediately dug up by mice and consumed on the spot. The fate of the sand reedgrass has not

Cuttings of golden willow and red-stemmed dogwood were put out in the wet bottom lands of the Porcupine Game Range early this spring. Exceptionally cold weather froze these cuttings back to the ground line and it is not known as yet whether or not some of these will grow from parts protected from the unseasonable cold and heavy snows of late May and June.

Job I-F: Weather Data

The weather station at the Porcupine Game Range was discontinued in March. The equipment was transferred to the Game Range Manager who has maintained the weather station for the Porcupine area since April. This information and data is recorded for reference.

Job I-G: Seed Analysis

Native seed was not collected for analysis this year because there were no personnel in that location to do the collecting.

Job I-H: Fertilizer Trials

The status of the fertilizer trials has been reported up to the first quarter of the passing year. There have been some interesting developments since that time and considerable work done on this problem this spring in regard to why abundant forage is produced in mushroom rings oftentimes on apparently sterile sites. Why we cannot simulate this production artificially is yet to be determined.

In brief, previous work done both in the greenhouse at Montana State College through the winter and in a mushroom ring producing area on Slide Creek ridge last summer shows that of all the fertilizers, plant hormones, and other treatments subjected to this particular area, the skim milk treatment produced an increased volume of forage most nearly simulating the forage production on mushroom bearing areas.

Potted plant tests have been carried on throughout the winter at Montana State College. Plants to be treated were grown from seed in soil packed in from Slide Creek ridge. Treatments are as follows:

	Water Treatment			
	60 cc.	120 cc.	180 cc.	240 cc.
	Pot Numbers			
Check	1	10	19	28
NPK	2	11	20	29
Hormones	3	12	21	30

been so definite. This grass sprouted from the rhizomes planted in shallow sandy soil but, for the most part, succumbed during the lengthy dry season following the planting. Some of these plants survived the long dry summer and may take hold. The Siberian wild-rye grass did by far the best of all species planted to date. It has sprouted and on last examination appears to be doing quite well. Quackgrass rhizomes were planted at various locations to determine its drought resistance. Some of these plantings are doing well, possibly because of an extended wet period following the planting. Because of this exceptionally wet period, the drought resistance of this grass has not been demonstrated to date, but it should show up more clearly as the season progresses.

B. Browse Revegetation

The propagation of old man wormwood (Artemisia arbrotanum), has been discontinued because this plant does not seem to be able to produce any material growth even when planted in the more moist protective sites. Generally, the first season following the planting of this species, fair to excellent results have been obtained as far as survival is concerned. However, each succeeding year cuts down the survival figure, for growth is limited to the production of one or two short stalks varying from six to twelve inches in length, each bearing several feeble leaves. Some of these plants are now five years old and are still persistently hanging on producing a small stem each spring and dying back to the ground level late each summer. It is apparent that these persistent plants cannot hope to become a significant part of the vegetational cover and so further trials on this species have been discontinued.

Hopvine was not planted this last spring because the planting stock was not available.

Virgin's Bower (Clematis linguisticifolia) was sown again this spring but as before, there was no apparent germination of this species. (Kochia scoparia) firebush, seeding was repeated with supposedly viable seed obtained from Miles City. There was no apparent germination of this species either. Horizontal juniper (Juniperus horizontalis) was collected again last fall and cuttings were again calloused and rooted at the State College in Bozeman. These cuttings were planted in several locations throughout the elk winter range and survival seems to be relatively good to date. Many of those cuttings planted last year, which turned a dull reddish brown because of lack of moisture and were considered dead last fall, did not succumb after all. Heavy precipitation this spring has caused many of these rooted cuttings in the Porcupine area to green up and put on up to two inches of new growth. It is hoped that this season's planting will do as well.

Water Treatment (contd.)

	60 cc.	120 cc.	180 cc.	240 cc.
	Pot Numbers			
K. Napthalene	4	13	22	31
NPK + Hormones	5	14	23	32
NPK + Hormones + K. Napthalene	6	15	24	33
Hormones + K. Napthalene	7	16	25	34
Skim Milk	8	17	26	35
NPK + K. Napthalene	9	18	27	36

Ten seeds of slender wheatgrass were planted in each pot and were thinned to five plants each. One thousand grams of soil were used in each pot.

Solution I	NH_4NO_3 KH_2PO_4	500 ppm. - add 10 ml. of 10 g/l. sol each week for 5 weeks
Solution II	Hormones Biotin Hypoxanthine Nicotinic acid Pantothenate Pyridoxine	25 ppm. each - add 10 ppm. each week for 5 weeks prepare 1 liter of 500 mg. of each hormone, then use 10 ml. each week per pot
Solution III	Napthalene acetic acid	50 ppm. - use 10 ml. of 1 g/l sol each week for 5 weeks
Solution IV	Skim milk	150 ml. 1st week - 10 ml. 2nd week - 20 ml. 3rd week - 30 ml. 4th week - 40 ml. 5th week - 50 ml.

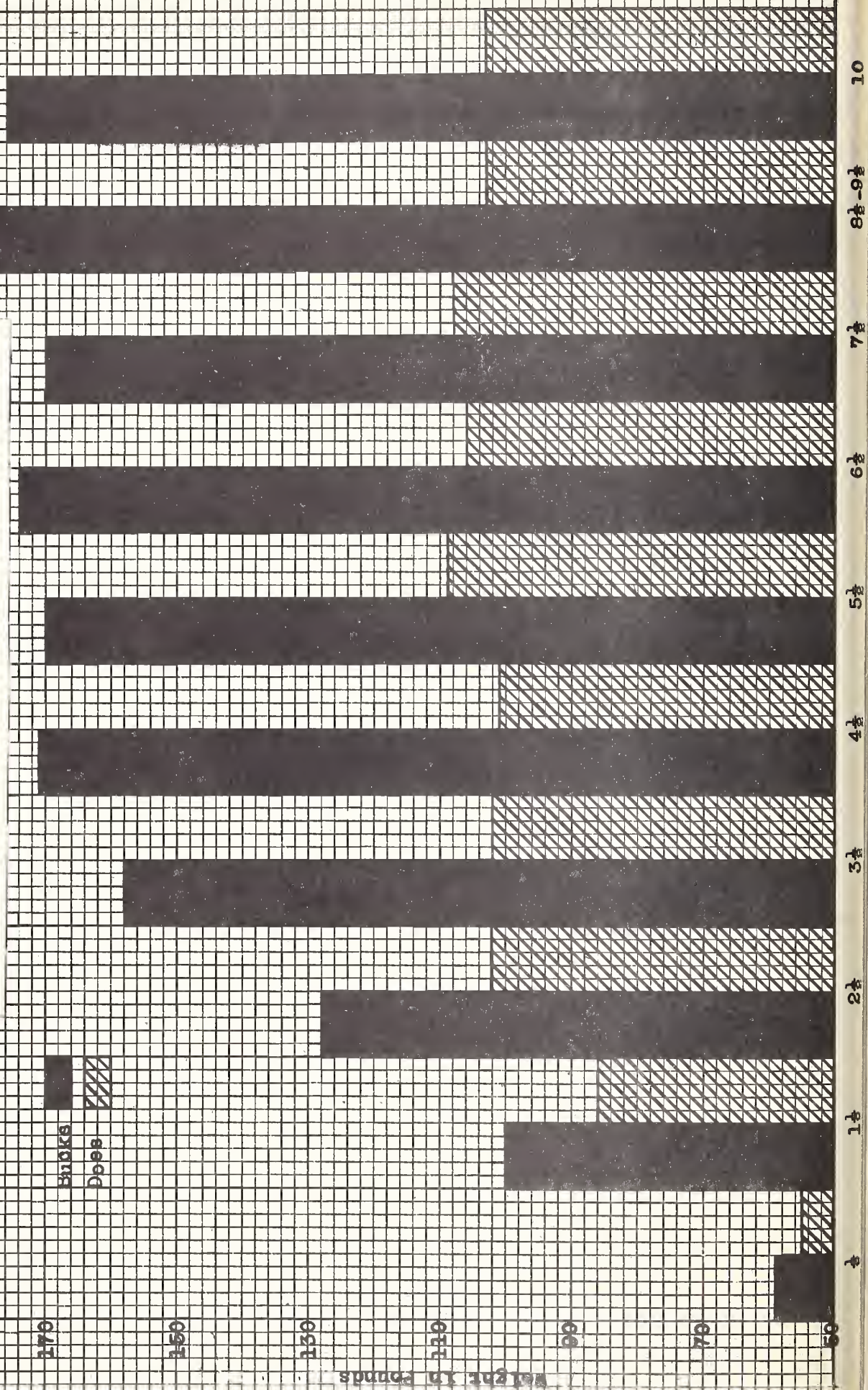
As stated previously, the skim milk treatment (Sol. IV) produced the best results in these trials. The next most effective solution (No. I) was that containing N. K. P. The Napthalene treatment (Sol #3) tended to inhibit rather than increase production.

FIGURE V.

AVERAGE HOG DRESSED WEIGHTS BY SEX AND AGE CLASS

WHITE-TAILED DEER 1953 BIG GAME SEASON

FISHER RIVER - WOLF CREEK AREA



In 1950, Figure IV, the $1\frac{1}{2}$, $2\frac{1}{2}$, and $3\frac{1}{2}$ year age classes were at a minority, 42 percent, when compared to the remaining older age classes. At that time the either-sex season had been in effect only one season prior, thus there was still a considerable number of older does available for harvest. The findings were based on a sample of 145 animals. With a continued either-sex deer season, the three preceeding harvests definitely indicate that the undesirable age class distribution has been radically changed so that now the majority of deer, 70.8 percent (fawns excluded) are within the $1\frac{1}{2}$, $2\frac{1}{2}$, and $3\frac{1}{2}$ year age classes. The findings in 1953 were based on a sample of 269 animals.

It can be assumed that there is no selective harvest with regard to age beyond the fawn class. To account for possible selectivity with regard to fawns, Figures II, III, and IV are shown inclusive and exclusive of the 6 month age class.

Weights: An attempt was made to compare present animal weights with those of the 1949 big game season in the Fisher River-Wolf Creek area though an inadequate sample in 1949 would not justify this.

The slight overall gain in animal weight from 1952 to 1953, Table 7, can no doubt be attributed to extremely mild climatic conditions during the winter of 1952-53. In general the white-tailed deer remained on the summer ranges which afforded fair to excellent wintering feed. Rather than the expected wintering weight loss, animals maintained their weight through the winter, permitting an excess gain prior to the big game season.

A factor of importance and interest is the stabilization of buck and doe weights at an early age, Figure V. In other words, does between the ages of $2\frac{1}{2}$ and $3\frac{1}{2}$ and bucks between the ages of $3\frac{1}{2}$ and $4\frac{1}{2}$ have achieved their mature weights with no appreciable gain with age thereafter. This further indicates that a young and potential deer herd can be maintained without sacrificing a mature weight loss.

It is recommended that in the future careful emphasis be given to annual weights in relation to age classes (Figure V) and winter range conditions. Findings in other white-tailed deer herds where extreme weight loss trends were found in direct relation to over-populated and over-utilized winter ranges will be of considerable value. A comparison should also be made of the animal weights in the Fisher River-Wolf Creek area with those of white-tailed deer herds on similar sites of better range conditions in this State, to determine if a weight loss trend is evident.

Examination of the findings from various other states has led to the inescapable conclusion that deer from problem areas (over-populated and over-utilized ranges) are inferior physical specimens. This fact has long been suspected by both veteran deer hunters and biologists.

FIGURE IV.

PER CENT OF TOTAL WHITE-TAILED DEER KILL BY AGE CLASS

1950 ANTLERLESS DEER SEASON

FISHER RIVER - WOLF CREEK AREA

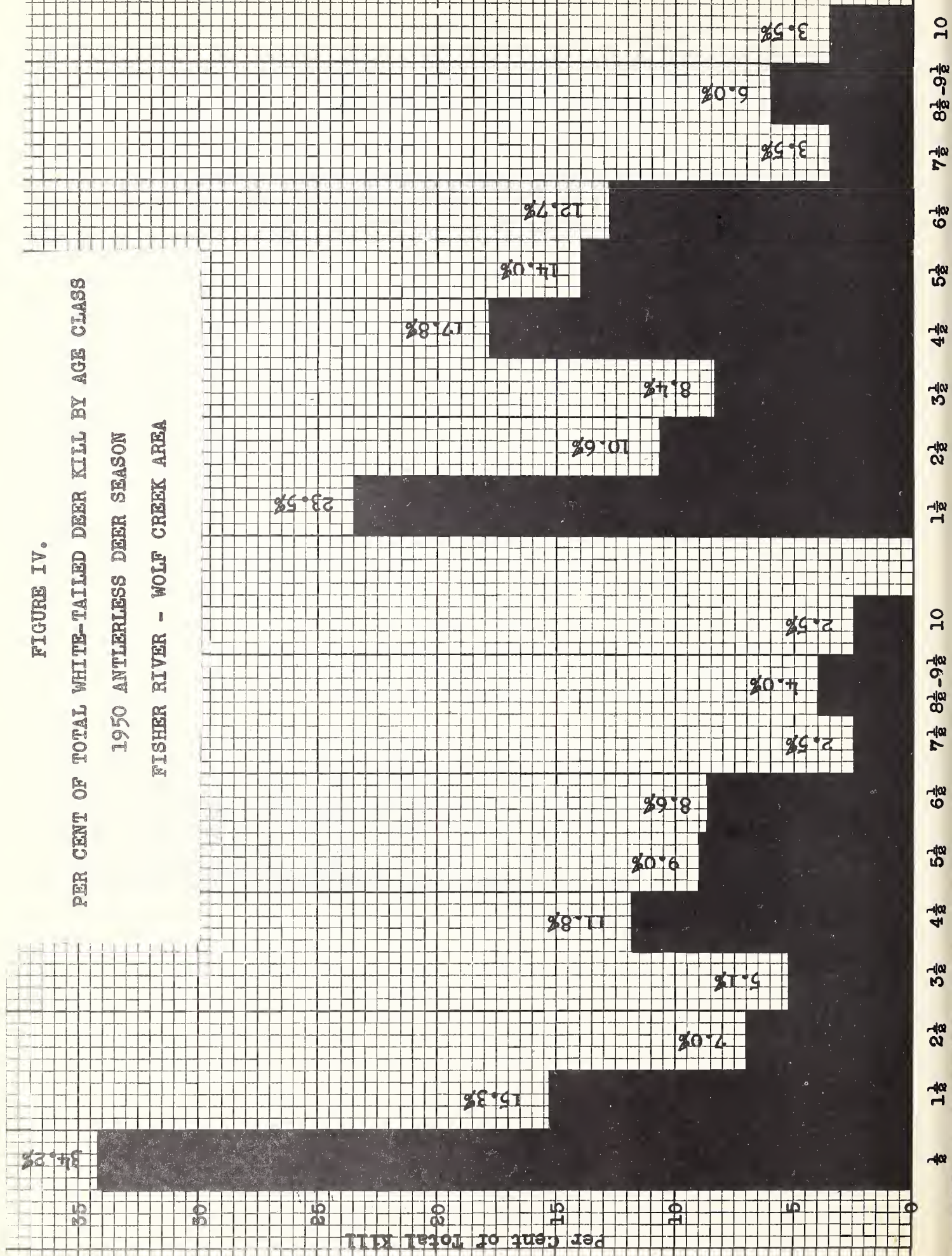


FIGURE III.

PER CENT OF TOTAL WHITE-TAILED DEER KILL BY AGE CLASS

1952 ANTLERLESS DEER SEASON

FISHER RIVER - WOLF CREEK AREA

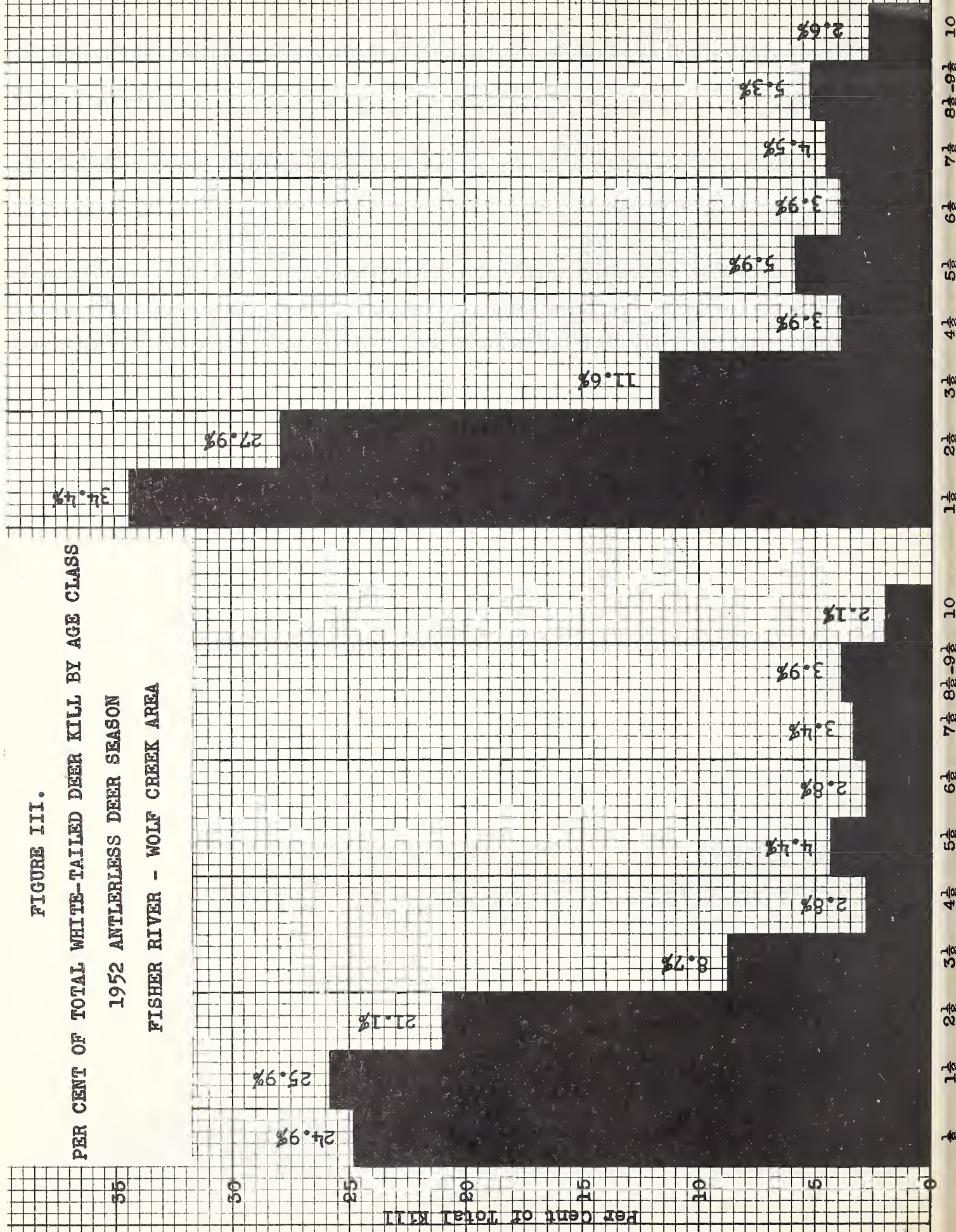


FIGURE II.

PER CENT OF TOTAL WHITE-TAILED DEER KILL BY AGE CLASS

1953 BIG GAME SEASON

FISHER RIVER - WOLF CREEK AREA

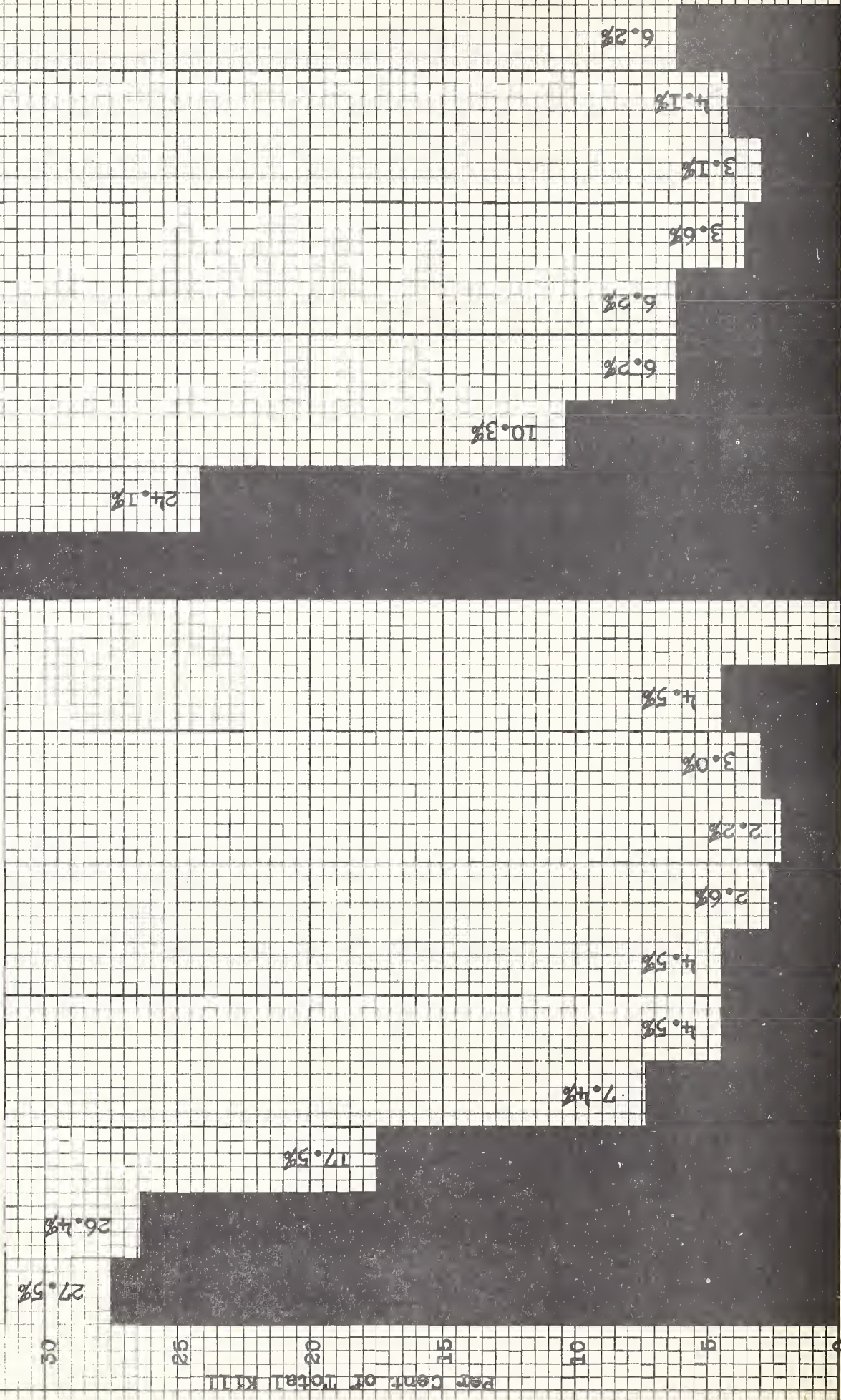


Table 6. Buck-Doe-Fawn Kill Recorded at Libby Checking Station, 1953 Big Game Season.

	White-tailed				Mule Deer			
	Bucks	Does	Fawns	Total	Bucks	Does	Fawns	Total
No. Killed	63	23	13	99	30	7	2	39
Percent of Kill by Species	63.64	23.23	13.13	100.00	76.93	17.95	5.12	100.00
Percent of Total Kill	45.65	16.66	9.42	71.73	21.74	5.07	1.46	28.27

A summary of the big game harvest recorded by checking stations during the 1953 season in Lincoln County is as follows:

White-tailed deer	383
Mule deer	72
Elk (bulls)	45 (recorded from Warland south)
Black Bear	9
Grizzly Bear	1 (killed in East Fisher River area)

Age Composition of White-tailed Deer: From the Fisher River-Wolf Creek area the lower jaws of 83.5 percent of the white-tailed deer killed were collected and aged according to the Severinghouse method. No attempt was made to collect and age mule deer jaws due to the lack of sound aging techniques for this species.

In conjunction with findings in 1952 (Figure III) and 1950 (Figure IV) one of the most important factors revealed in the aging analysis is the apparent reduction of older deer and a continued increase of younger and more potential age classes, $1\frac{1}{2}$ to $3\frac{1}{2}$ years old, inclusive (Figure II). By comparing Figure II and III with Figure IV evidence is that the proper age composition of the white-tailed deer herd is being achieved through an annual either sex season. This is one of the more important goals strived for in sound herd management.

FIGURE 1.

PERCENT KILL BY AGE CLASS AND SEX - WHITE-TAILED DEER

1953 BIG GAME SEASON

FISHER RIVER - WOLF CREEK AREA

Inserted % is Per Cent of Sex Kill

Per Cent of Total Kill

30

25

20

15

10

5

0

35.0%

29.7%

14.5%

5.1%

7.2%

2.9%

2.2%

1.5%

0.7%

1.5%

25.2%

17.6%

20.6%

9.9%

1.5%

6.1%

3.1%

3.1%

5.3%

7.6%

4

1 1/2

2 1/2

3 1/2

4 1/2

5 1/2

6 1/2

7 1/2

8 1/2

9 1/2

10 1/2

1 1/4

2 1/4

3 1/4

4 1/4

5 1/4

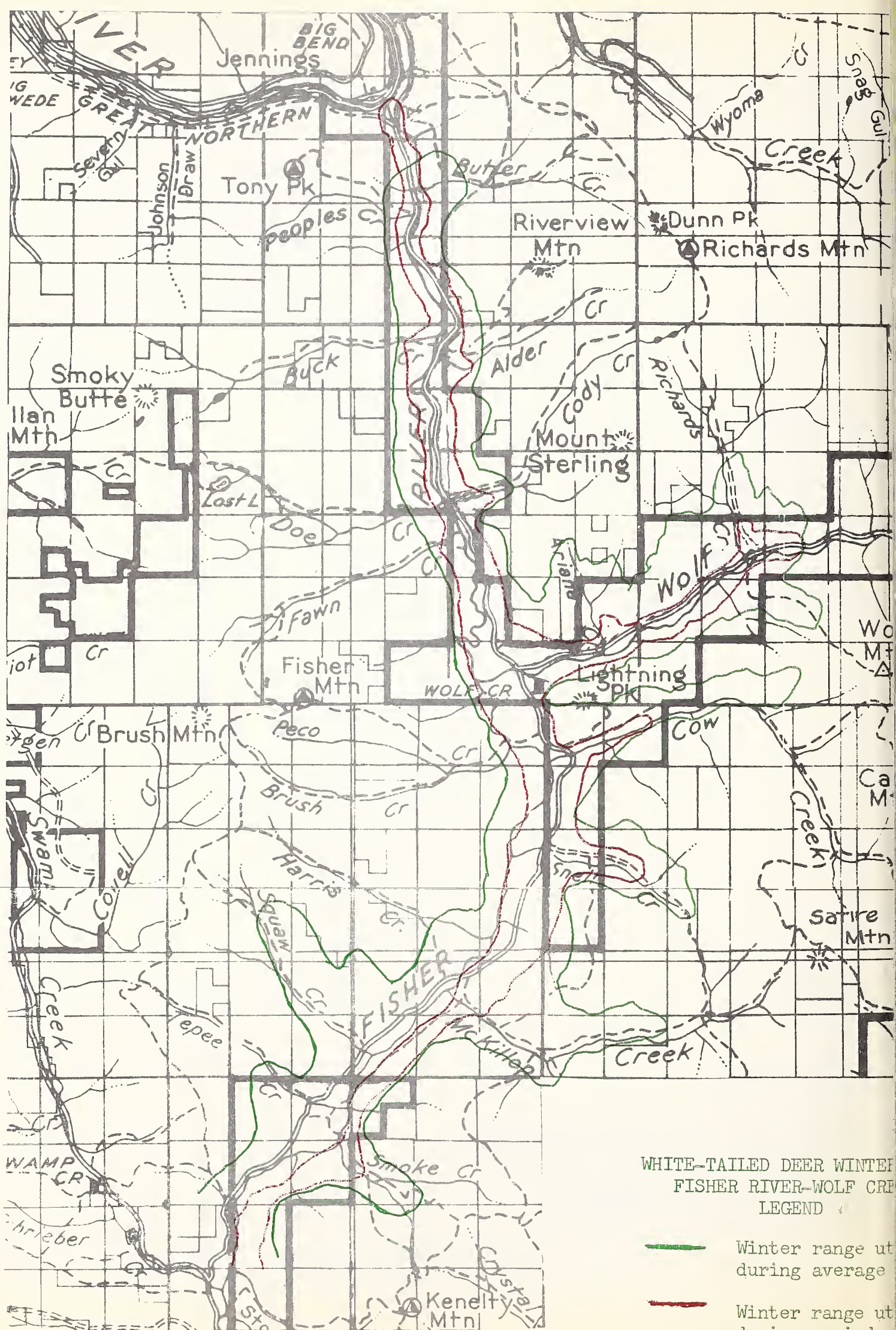
6 1/4

7 1/4

8 1/4

9 1/4

10



WHITE-TAILED DEER WINTER
FISHER RIVER-WOLF CREEK
LEGEND

- Winter range during average
- Winter range during periods

From the white-tailed deer taken in the Fisher River-Wolf Creek area it was found that 1.01 mature bucks were killed per 1.00 mature doe; 0.7 fawns were killed per 1.00 mature doe; and 1.24 buck fawns were killed per 1.00 doe fawn. To further indicate the relationship of harvest by age class and sex, note Figure I where both the percentage of total kill by age class and also the percentage of kill by sex are given.

Table 5. Buck-Doe-Fawn Kill in the Fisher River-Wolf Creek Area, 1953 Big Game Season.

	White-tailed					Mule Deer			
	Bucks	Does	Fawns	Uncl.	Total	Bucks	Does	Fawns	Total
No. Killed	103	104	74	3	284	23	8	2	33
Percent of Kill by Species	36.27	36.62	26.06	1.05	100.00	70.0	24.24	6.06	100.00
Percent of Total Kill	32.49	32.81	23.34	0.95	89.59	7.26	2.52	0.63	10.41
Percent of Total Kill 1952*	32.70	33.10	19.60		85.40	9.20	3.50	1.90	14.60

* During antlerless season.

The Libby checking station was established in an effort to obtain a random sample of the hunting season results from areas north and south of Libby, excluding the Fisher River-Wolf Creek drainages. From data recorded 727 hunters killed 99 white-tailed deer, 39 mule deer, 32 bull elk, 3 black bear, and 1 grizzly bear. Checkers estimated that approximately twenty-five percent of the deer hunters stopped at the station.

The deer and elk hunter success was 23.38 percent with white-tailed deer comprising 71.73 percent of the total deer harvest, Table 6. Legal bucks made up 59.42 percent of the total deer kill, while all bucks (fawns included) were 65.22 percent of the kill (8 buck fawns and 7 doe fawns). The variation in percentage of legal bucks compared to legal does harvested between the Fisher River-Wolf Creek area and the sample recorded at the Libby station can be attributed partially to a human psychological factor regarding the traditional pride of displaying a buck more readily than a doe or fawn. The Libby checking station, located on Highway #37 could easily be avoided by hunters, if they so desired, whereas exit from the Fisher River-Wolf Creek area could not be made without the knowledge of the checkers.

over-stocked winter ranges to be depleted beyond feasible recovery. If this situation continues, it is quite probable that starvation and predation may be the factors that are more apt to control the herd rather than hunting.

Annual hunter harvest and wintering white-tailed deer populations are shown in Table 4.

Populations based on both estimated and calculated numbers over a 19-year period indicate an approximate one hundred to one hundred and twenty percent overall increase in white-tailed deer on the Fisher River-Wolf Creek winter ranges. Animals available in the area during the big game hunting seasons are only a percentage of those wintering there, due to post-season migration from adjacent summer ranges.

Table 4. Annual Deer Harvest and White-tailed Deer Populations Wintering in the Fisher River-Wolf Creek Area.

Year	Number of Deer Harvested	Number of Hunters	Percent Hunter Success	Wintering White-tailed Deer Population
1935				*4,919 (Winter 1934-1935)
1942				5,140 (Winter 1942-1943)
1948	126	822	15.33	3,840 (Winter 1947-1948)
1949	209	1,381	15.06	7,250 (Winter 1948-1949)
1950	579	2,942	19.68	6,000-8,000 (Winter 1949-1950)
1952	260	1,127	23.07	
1953	317	1,752	18.09	
1954				10,917 (Winter 1953-1954)

* Population includes Dunn Creek.

Eighty-nine and fifty-nine hundredths percent of the deer harvested in the Fisher River-Wolf Creek area were white-tailed, Table 5. Generally the mule deer range higher and farther from access roads and are therefore less apt to be taken by the average hunter.

Legal bucks comprised 39.75 percent of the total deer kill. If buck fawns were included, bucks would make up 45.74 percent of the total kill. In all there were 42 buck fawns and 34 doe fawns harvested. Percentages of the buck-doe-fawn harvest were very similar to those of the 1952 antlerless deer season, note Table 5.

By comparing the weather conditions during the 1953 big game season with those of 1948, 1949, 1950, and 1952, it has been found that, in general, mild weather prevailed. This has been concluded as one of the more important factors contributing to a deficient seasonal deer harvest in the Fisher River-Wolf Creek area, where intensive data has been collected.

Hunter Harvest: In the Fisher River-Wolf Creek area, 1,765 hunters killed 284 white-tailed deer, 33 mule deer, 13 bull elk, and 6 black bear. This gives a hunter success on deer and elk of 18.76 percent.

The Island Lake station checked out the largest number of deer killed. As can be seen in Table 3, 176 or 55.52 percent of the deer checked came through this station while 141 or 44.48 percent came through the Waylett station. The latter station checked the greatest number of hunters, however, with a lower hunter success of 15.26 percent.

Table 3. Deer Kill Recorded in the Fisher River-Wolf Creek Area 1953 Big Game Season.*

Station	White-tailed Deer	Mule Deer	Total	% of Total Kill	No. Hunters	% of Hunter Success
Island Lake	164	12	176	55.52	828	21.25
Waylett's	120	21	141	44.48	914	15.26
Total	284	33	317	100.00	1,752	18.09

* Table exclusive of elk taken.

Annual deer harvest and hunter success in the Fisher River-Wolf Creek area has been consistently below that needed to adjust to a proper animal-range balance. The excessive post season increment has resulted in an accumulative burden on the already over-utilized ranges.

As early as 1934 and 1935 big game-winter range investigations were conducted in the Fisher River-Wolf Creek area (Brink, Tester, and Bergeson, 1942). Conclusions were that key browse species had been utilized, in the past, to the point of killing and both emergency and food species had been over-utilized.

Deer-winter range trends since those early investigations have directly shown: 1. A continued increase in white-tailed deer numbers beyond proper range condition balance; 2. A continued over-utilization of winter ranges; and 3. A deficient annual hunter harvest. These factors result not only in a loss of harvestable deer through winter mortality but also jeopardize the future of the white-tailed deer herds by permitting the

Table 2. Daily Weather Conditions During the 1953 Big Game Season.*

Date	Temperature		Precipitation	
	Maximum	Minimum	Amount	Kind
October				
12	77	26		
13	69	27		
14	72	28		
15	69	30		
16	61	30		
17	No Records			
18	No Records			
19	65	30		
20	63	24	0.01	Rain
21	58	35	0.06	Rain
22	57	22		
23	57	18		
24	No Records			
25	No Records			
26	63	17		
27	62	25		
28	60	27		
29	57	29	0.02	Rain
30	55	39	0.02	Rain
31	60	44	0.03	Rain
November				
1	No Records			
2	55	18	0.12	Rain
3	48	13		
4	42	14		
5	39	17	0.01	Rain
6	44	30	0.04	Rain
7	No Records			
8	No Records			
9	55	29		
10	39	29		
11	No Records			
12	46	28	0.12	Rain
13	44	34		
14	No Records			
15	No Records			
16	51	32	0.50	Snow
17	42	29		
18	33	23		
19	24	24		

* All weather data taken from the Libby Ranger Station, Kootenai National Forest. Data recorded each a.m. for the previous 24-hour period.

Department relations a great deal.

The names of the checking station personnel and station locations are listed in Table 1.

Table 1. Checking Stations and Personnel Maintained by the Lincoln County Project During the 1953 Big Game Season -- October 15 to November 15, Inclusive.

<u>Station</u>	<u>Checkers</u>	<u>Location</u>
Waylett's	Paul Stamschror Grace H. Haschke	T. 27 N., R. 30 W., Sec. 19, at the junction of Highway #2 and the lower Fisher River road.
Island Lake	Jones D. Copeland Edward G. Mertel	T. 29 N., R. 26 W., Sec. 31, at the south end of Island Lake.
Libby	Howard F. Bell William H. Boothman	T. 31 N., R. 31 W., Sec. 34, on Highway #37 just north of Libby city limits.

At the close of the big game season data obtained from the checking station cards was classified and analyzed. Data concerning animal kills included species, sex, antler beam diameter, number of points on antlers, weight, length of hind foot, age (lower jaws of white-tailed deer were collected for post-season verification of animal age), and location of kill. Cards were filled out for successful hunters only.

Information concerning the hunter included his name, address, game license number and county of permanent residence. In addition to this each successful hunter was given a record of his kill which afforded him with the physical characters of his animal, as weight, age, etc.

Findings:

Weather Conditions: Weather conditions during the 1952 big game season were not conducive to a proper deer harvest. In general this same situation prevailed during the 1953 season, again seriously hampering the needed animal harvest. As shown in Table 2, diurnal temperatures were consistently above freezing, and even though there was some precipitation, it was insufficient to greatly improve hunting conditions. The first appreciable snowfall at lower elevations occurred on November 16.

The existing combination of climatic factors not only resulted in dry ground conditions but also retarded the deer movement to lower elevations and open timbered sites.

Pacific Railroad, State of Montana, and the Kootenai National Forest.

Vegetative cover on the area varies with the site. Ponderosa pine dominates south and west exposed slopes with Douglas fir and western larch being the dominant species on the north and east exposures. In general, the lower flats and benches are covered with "doghair" stands of lodgepole pine, interspersed with thickets of Douglas fir; the overstory generally being ponderosa pine and western larch.

Browse conditions on the summer game ranges are good to excellent. On the winter ranges, consisting of 26,343 acres, the browse conditions are fair to critical. During severe storm periods white-tailed deer, and elk to some extent, are further restricted to a critical winter range of 9,301 acres consisting of stream bottoms and lower benches.

Objectives:

To analyze and correlate data collected through checking stations for the purpose of determining biological properties and trends of the deer herds on a specified area.

Technique:

Station Operation: Three big game checking stations were maintained by the Lincoln County project from October 15 to November 15, 1953, inclusive. Two were located to collect data only from the Fisher River-Wolf Creek area, while the third was situated just north of Libby on Highway #37 to obtain a random sample of hunting season data from the remainder of the county. The two Fisher River-Wolf Creek stations were so placed that approximately a ninety-eight percent sample of hunting data was collected from that area.

Each station was manned by two men (with exception of one where there was a man and woman combination) for the entire big game season. However, it is recommended that in the future the stations in this area be operated only during the either-sex portion of the season. Hunting pressure is too light during the bucks-only season to warrant the cost of operating a station.

The excellent cooperation received from the hunters was due to their interest in the advancement of biological work as well as to the courtesy of the station operators. All checkers were intently interested in procuring the best results from their work and used every precaution in gathering accurate data so far as their capabilities permitted. Checkers were residents of this area which proved of great value in aiding sportsmen with general questions concerning hunting sites and past hunting conditions. This asset strengthened the hunter-

STATE	Montana		
PROJECT NO.	W-36-R-3		
DATE	July 15, 1954		
VOL.	V	NO.	2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report

Job No. II-A

Investigations Project

Title of Job: Age Classification, Sex Ratio and Reproductive Potential of
White-tailed Deer

A. 1953 Big Game Season - Checking Stations

B. Deer Herd Composition Count

Introduction:

Past surveys and investigations have shown the necessity of operating big game checking stations within the county to obtain biological data basic to the proper management of the deer herds.

The regular big game season on bull elk and buck deer in Lincoln County extended from October 15 to November 15, inclusive, a total of 32 days. An antlerless deer season (hunter's choice) ran concurrently with the regular buck season from November 1 to November 15, inclusive, a total of 15 days.

This report summarizes the results of the big game season from data obtained through checking stations, with special emphasis placed on the Fisher River-Wolf Creek area. Investigations have been concentrated on this area annually due to the continued increase of white-tailed deer on the winter ranges and the over-utilization of these ranges. The increasing seriousness of the game-winter range-timber reproduction conflict warrants intensive investigations and immediate action toward the mitigation of this problem.

The principal area covered by the data in this report includes all of the lower Fisher River and its tributaries north of U. S. Highway #2, an area of approximately two hundred and thirty-two thousand acres. With the exception of a few scattered homesteads, title to the land is held by the Anaconda Copper Mining Company, J. Neils Lumber Company, Northern

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Prepared by:

Name Robert M. Blair

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Date July 15, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Table 2. Daily Weather Data--Winter 1953-54

Date	Temperature		Precipitation		
	Maximum	Minimum	Amount	Kind	Inches
*February					
1	35	31			
2	37	No Record			
3	34	30			26.20
4	No Record	26			25.80
5	42.5	26			25.50
6	40.5	18			25.15
7	42	18			24.80
8	39	13			24.40
9	42.5	12			24.20
10	42	18	0.02	Snow	24.80
11	34	7			24.30
12	30	18	0.71	Snow	31.00
13-14	No Record				
15	38.5	28	0.71	Rain	28.80
16	51.5	29.5	T	Rain	27.15
17	47	24			26.30
18	No Record				
19	50.5	24.5	0.07	Rain	23.30
20	40	33	0.25	Rain	21.95
21	42	28	0.24	Rain	21.65
22	No Record				
23	47	26	0.01	Rain	20.75
24	No Record				
25	50	29	0.28	Rain	17.90
26	39	25.5	0.06	Rain	17.80
27	42	20.5			17.70

* Data recorded at weather station established on Cow Creek in the Fisher River area. Recorded each a.m. for the previous 24 hour period.

Table 1. Daily Weather Data--Winter 1953-54

Date	Temperature		Precipitation		
	Maximum	Minimum	Amount	Kind	Inches
*January					
12	23	4			
13	27	15	0.03	Snow	.25
14	27	11	0.48	Snow	5.75
15	2	0	0.62	Snow	11.00
16	4	0	No Record	Snow	3.00
17	8	-2			
18	15	-1	0.07	Snow	1.00
19	13	-13	0.01	Snow	T
20	0	-32			
21	1	-25	0.20	Snow	2.50
22	9	0	1.23	Snow	23.00
23-24	No Record	No Record	0.49	Snow	5.00
25	24	10			
26	30	4	0.09	Snow	1.00
27	20	5	0.18	Snow	3.25
28	36	17	0.14	Snow	2.00
29	37	9			
30-31	No Record	No Record	0.05	No Record	

* Data obtained from Libby Ranger Station, Kootenai National Forest.
Recorded each a.m. for previous 24 hour period.

Of noteworthy interest during the course of field counting was the carcass of a pregnant doe $3\frac{1}{2}$ years of age, bearing velveted antler buttons approximately three-quarters inch in length. Internal examination revealed twin fetuses, 1 male and 1 female. The cause of death was determined as starvation.

After deducting the winter mortality of 1,228 animals from the 1953-54 wintering population of 10,917 animals a residual population of 9,689 white-tailed deer remained. These animals dispersed onto their respective summer ranges with the recession of snow melt.

Discussion:

Due to the over-utilized condition of the Fisher River-Wolf Creek winter range the severity of winter mortality, where malnutrition is the major causative factor, is directly influenced by the prevailing winter climatic conditions. During normal winters the white-tailed deer herds range over an area of approximately 26,343 acres, however, during periods of excessive snow depth these same herds are forced off of the steep slopes and into the bottom lands restricting their range to approximately 9,301 acres.

The combination of deep fluffy snow and steep slopes greatly inhibits the ability of the animals to obtain adequate food and also renders them virtually immobile, thus forcing a movement into the stream bottoms.

Snow conditions during the winter of 1953-54 were such that the entire white-tailed deer herd was forced to restrict its range to the 9,301 acres of critical range area. Along with the deer movement the elk were also forced to the bottoms and became direct competitors for food.

Relatively mild weather and open winter ranges prevailed into mid-January, 1954. On January 14th, note Tables 1 and 2, blizzard conditions had set in throughout the area with temperatures near zero. By the 19th, snow was approximately three feet in depth and the white-tailed deer began moving into the extreme bottoms; temperatures ranged as low as 32 degrees below zero. Snow depth steadily increased and by the 26th, a depth of 52 inches or more was present with signs of malnutrition becoming obvious in the deer herd by early February. The total snowfall for the months of January, February, and March was 62.75, 7.30, and 2.00 inches respectively.

By late February conditions were such that deer began moving out of the bottoms and onto the slopes.

The short duration of the critical period followed by a rapid exposure of south and west slopes can be attributed as averting a drastic herd mortality as might have been expected with the continuance of severe climatic conditions.

Deer/acre

.018

Total calculated carcasses on
slope range

307

The total white-tailed deer winter mortality as calculated on 26,343 acres of winter range was 1,228 animals. On the basis of a wintering population of 10,917 animals, this yields a winter herd mortality of 11.24 percent.

From a sample of 38 classified carcasses, the following age class and mortality data was determined.

Age Classes of Carcasses	Number	Percent Mortality
Fawns	19	50
3 $\frac{1}{2}$ years	1	
4 $\frac{1}{2}$ years	1	8
8 $\frac{1}{2}$ -9 $\frac{1}{2}$ years	1	
10+ years	<u>16</u>	<u>42</u>
Total	38	100

Marrow examination within the tibia of each carcass revealed that the probable cause of death was due to malnutrition in 37 of the 38 animals. The cause of death of the other animal was determined as probable coyote predation. No pathologic investigation was made of carcasses to determine if disease was a contributing factor in death.

From a sample of 87 classified carcasses the following was determined:

Sex and Age of Carcasses	Number
Buck Fawns	10
Doe Fawns	18
Unclassified Fawns	14
Adult Bucks	20
Adult Does	20
Unclassified Adults	5

From the above data it was found that of the classified fawns, 35.7 percent were bucks and 64.3 percent were does, and of the classified adults 50.0 percent were bucks and 50.0 percent were does, with total fawns comprising 48.2 percent of the sample and total adults 51.8 percent.

A problem that is continuing to exist is a low hunter harvest which in turn permits a surplus of animals to winter on the already over-utilized ranges. With the persistence of this condition natural decimating factors operate toward the elimination of the animal surplus.

Objectives:

To accumulate annual winter mortality data on white-tailed deer wintering in the Fisher River-Wolf Creek area.

Technique:

With the assistance of Al Flint and Jack Francis, U. S. Forest Service; and Ray Dupler, Law Enforcement Division, Montana Fish and Game Department; a strip census was conducted from May 20 through May 24, 1954, to determine the extent of winter mortality. All strips were run parallel to the slopes. To allow for a variation in the distribution of carcasses with respect to slope, the overall area was divided into two units--that determined as winter range utilized during severe conditions and that utilized during normal conditions, excluding the bottom lands, i.e. bottom lands and south and west exposed slopes. (Refer to winter range map included in Completion Report for Job No. IX-A.) Carcasses were recorded by locality, sex, age when possible, and probable cause of death.

Findings:

Bottom-land or Critical Winter Range:

Total miles of strip 2 chains wide-- 53.3

Total acreage in strips-----853.4

Carcasses recorded----- 85

Total acreage of bottom-land or critical white-tailed deer winter range -----9,301

Deer/acre----- .099

Total calculated carcasses on critical range----- 921

Winter Range on Slopes:

Total miles of strip 2 chains wide-- 13.8

Total acreage in strips----- 220.8

Carcasses recorded----- 4

Total acreage of winter range on south and west exposed slopes ----- 17,042

STATE Montana
PROJECT NO. W-36-R-4
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report

Job No. I-A

Investigations Project

Title of Job: Lincoln Index Census Technique

WHITE-TAILED DEER WINTER MORTALITY COUNT

- A. White-tailed Deer Winter Population Determination
Fisher River-Wolf Creek Area
- B. White-tailed Deer Winter Mortality Count
Fisher River-Wolf Creek Area

- A. White-tailed Deer Winter Population Determination--Fisher River-Wolf
Creek Area, Winter 1953-54

Job completion report printed in Montana Fish and Game Commission
Quarterly Report, January-March 1954.

- B. White-tailed Deer Winter Mortality Count--Fisher River-Wolf Creek Area,
Winter 1953-54

Introduction:

Each winter, even during mild years such as 1952-53, a certain proportion of the Fisher River-Wolf Creek white-tailed deer die on the winter range from miscellaneous causes. It is a natural expectation that a fractional number of any deer herd will succumb to various infirmities of one type or another--accidents, parasites, disease, old age, and malnutrition, though sound herd and range management can maintain this at a minimum.

Information of great value in the management of deer herds may be obtained by a count and analysis of the carcasses of animals that have died on the winter ranges. Amassed data on ages, sexes, location of carcasses, number, and probable causes of death, may aid in solving the many complex problems not only regarding deer mortality but also regarding hunter harvest, range condition, and carrying capacity. These are important factors involved in coordinating multiple land use on the area.

than during the same period of 1953.

In the summer, antelope herds can be found throughout the Medicine Lodge drainage and there is no way of telling which are native and which are Idaho migrants.

Any hunting season in this area can be set only after a census has been conducted during the summer preceding the season. This census should be conducted no earlier than the latter part of June.

Area 47 antelope maintain approximately the same range throughout the year. The only migration seems to be a vertical one with the antelope working down to lower elevations as the snow cover increases.

A check on the population, herd increase, and distribution is to be conducted in this area before the permits for the 1954 hunting season are issued.

The antelope in Area 48 winter in the vicinity of Sage Creek Basin. Because of the comparatively small wintering area this herd was reduced somewhat from the previous year. Also another reason for the large number of permits issued during the 1953 hunting season was to insure a better return on tagged animals (See Sage Creek Antelope Tagging).

Recommendations:

The aerial census of antelope in the Beaverhead should be continued from year to year to keep a close check on the population trend of the antelope in this area.

Prepared by:

Name Phil South

Date July 15, 1954

Approved by J. E. Gaab

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

<u>Area</u>		<u>No. of Antelope</u>
Area 48 on Hunter Map	(Sage Creek Basin	
	(Lima Area	629
	(Centennial Valley	
Total		1,167

Although antelope are found in the Centennial Valley, Sheep Creek Basin, and Grasshopper Creek areas in the summer, none were found in these areas during this year's census. The snow cover in the Centennial and Sheep Creek Basin is too deep to allow antelope to winter in these areas.

Conclusions:

A comparison of 1953 and 1954 Census figures:

<u>Area</u>	<u>No. of Antelope</u>	
	<u>1953</u>	<u>1954</u>
45	267	220
46	193	70
47	403	248
48	838	629

Antelope in Area 45 spend part of their time on private lands and must not be allowed to increase to a point where they become a nuisance.

Antelope in Area 46 were not hunted during the 1953 season. The number of animals in this area is more or less dependent on the influx of antelope from Idaho.

During the early part of the summer, antelope move from Idaho into Montana through South Medicine Lodge Creek and over Bannack Pass which is on the southeastern edge of Sheep Creek Basin. They summer in Sheep Creek Basin and Medicine Lodge. South Medicine Lodge Creek is in Idaho and arises near a low open pass on the divide separating Montana and Idaho. Medicine Lodge proper is in Montana and drains into Horse Prairie Creek from the northwestern edge of Sheep Creek Basin.

An aerial check of Sheep Creek Basin during the summer of 1953 showed 179 antelope in that area.

In the fall, usually about mid-October, antelope can be seen moving from Montana into Idaho through Bannack Pass. It seems evident, however, that at times some of them winter on lower Medicine Lodge and in Horse Prairie. The antelope populations in Medicine Lodge and Horse Prairie were very noticeably lower in the winter of 1954

STATE	<u>Montana</u>	
PROJECT NO.	<u>W-35-R-5</u>	
DATE	<u>July 15, 1954</u>	
VOL.	<u>V</u>	NO. <u>2</u>

Title of Project: Southwestern Montana Unit

Job Completion Report Job Nos. I-F, G, H Investigations Project

Title of Job: Big Game Survey in Ruby, Blacktail and Beaverhead River Areas

AERIAL ANTELOPE CENSUS AND DISTRIBUTION CHECK

Objectives:

To obtain a complete census and distribution pattern of antelope in the Beaverhead area.

Procedure:

A 135-Super cub and a 105-Super cub were used to cover all of the areas in the vicinity of Beaverhead County known to support substantial numbers of antelope. The areas censused were the same areas censused in February of 1953.

The flying was begun in mid-February and was continued whenever the weather permitted during the following week. The low-level flying that is required in censusing antelope was greatly hampered by high surface winds. Also, snow cover was spotty, making it more difficult to locate game than if the snow cover had been complete. These areas covered by air were also checked from the ground at intervals throughout the year.

Findings:

<u>Area</u>		<u>No. of Antelope</u>
Area 45 on Hunter Map	(Point of Rocks (Frying Pan Basin (Argenta Flats	220
Area 46 on 1952 Hunter Map	(Horse Prairie (Medicine Lodge (Sheepcreek Basin	70
Area 47 on Hunter Map	(Blacktail (Sweetwater (Stone Creek	248

Monument Mountain (Gallatin).

4. Six sheep were seen in Sheep Creek (Tom Miner Basin). The head of Rock Creek and the divide to the north were flown but no sheep were observed.
5. An aerial survey of the Mountain Rae area (West Boulder River) was made for mountain sheep, but no sheep or sign was observed.
6. Six Mountain Sheep were transplanted from the Sun River to Sixteen-Mile Creek (Deer Park)--2 yearling rams, 3 ewes (1 yearling) and one lamb. It is hoped that this transplant can be supplemented with more sheep from the Wildhorse Island herd (Flathead Lake).

Submitted by:

Approved by:

Name J. E. Gaab

Montana State Department of Fish & Game

Title Senior Biologist

By Faye M. Couey, Asst. Director

Wildlife Restoration Division

Date July 15, 1954

Goat Peaks.

- 11 goats - (9 adults and 2 kids) were seen at old salt lick on Pintlar Peaks
- 33 goats - (28 adults and 5 kids) in basin west of Storm Lake at an elevation of 8400 feet, the lowest elevation recorded during the survey.

Of the remainder there were two large groups--20 and 12. Most of the goats were in moist green basins under a high ridge or surrounded by timber instead of along the ridge tops. From ground observations the reason for this is forage availability and development.

2. Pioneer Mountains - Rocky Mountain Goat Aerial Survey

- 152 goats observed (120 adults, 32 kids)
- 15 (10 adults and 5 kids on Baldy Mountain)
- 33 (27 adults and 6 kids were scattered in Canyon and Trapper Creek)

Goats were scattered all through the country in the head of Wise River; the high country at the head of Wise River is very rough and appears to be very good habitat; however the goats weren't plentiful.

Very few goats in the rough country west of Wise River, and no sign of goats on Trident and Foolhen Mountains. Goats have been observed in the past, but not frequently on these mountains. It is likely that observations in the past were of transient animals.

- 3. The head of the Big-hole River along the Idaho-Montana border was examined superficially for goats. Only four adult goats were seen. Tracks on snow banks indicated presence of others. The density of the population as compared to the Pintlar and Pioneers would be considered much lower.

Work Plan VIII: Rocky Mountain Sheep Investigation

- 1. Aerial survey of mountain sheep in the Spanish Peaks indicated a total of 143 animals, 27 of which were classified as having 1/2 to full horn curls.
- 2. Twelve sheep were counted by air at the head of Hyalite Creek.
- 3. Thirty-one sheep were counted in the vicinity of

in males and corpora lutea in females gave information on time of breeding. Live-trapped and dead animals were examined to obtain data on dentition, weights, body measurements, and horns. Each is evaluated as a criterion for estimating age. Seasonal movements are described. Distribution of animals from original release site is delimited. Live-trapped goats were marked and released for movement studies. Effectiveness of marking is discussed. Two observations on longevity are recorded. Other observations of activities and behavior, pelage, moisture requirements, and adverse factors are described.

2. A Two-Year Investigation of the Food Habits and Range use of the Rocky Mountain Goat in the Crazy Mountains, Montana by Jack K. Saunders, Jr., Junior Biologist.

An investigation of the food habits and range use of an introduced Rocky Mountain goat herd was conducted in the Crazy Mountains, Montana, 1952-1953. A general description of the various vegetative types inhabited by goats is given. The time of day when feeding animals were observed and the seasonal utilization of feeding areas are discussed. Information concerning the age at which mountain goat kids begin grazing is included. Several methods of studying food habits are reviewed. The procedure used for stomach analysis is described. Observations of animal use of plants on summer feeding areas, and the analyses of 27 stomach samples collected throughout the year, are considered in the food habits evaluation.

Complete reports from which these abstracts were taken are on file in the Regional and Washington offices of the Fish and Wildlife Service as well as at the headquarters of the Montana Fish and Game Department in Helena.

Job VII-B: Investigation of Native Mountain Goat Herds

1. Pintlar Mountains - Rocky Mountain Goat Aerial Survey

196 goats observed (152 adults, 44 kids)
See Lentfer's thesis for comparison of ground and aerial classifications. Most of the goats were in the Pintlar Peaks area, East and West Goat Mountains and scattered to the North and Northeast. There were very few goats between the Pintlar Peaks and

4	-	Coyote Creek
4	-	Bloody Dick Creek
35		Total

3. The Big Hole River and all the drainages leading into it from above Divide were covered in an aerial moose census of that area. The findings are listed by Drainages as follows:

22	-	Big Hole River above Jackson
3	-	Big Hole River between Wisdom and Jackson
29	-	Big Hole River below Wisdom
26	-	Lake Creek areas
25	-	Swamp Creek areas
17	-	North fork of the Big Hole River
4	-	Plimpton Creek
13	-	Deep Creek
8	-	Squaw Creek
4	-	Warm Springs Creek
5	-	Fishtrap Creek
3	-	LaMarche Creek
5	-	Seymour Creek
2	-	Bryand Creek
6	-	Pattengaile Creek
20	-	Wise River
4	-	Doolittle Creek
2	-	Madd Creek
198		Total

4. An aerial moose census was conducted in the Hebgen Lake area: 38 moose were observed.

Work Plan VII: Rocky Mountain Goat Investigation

Job VII-A: Investigation of Planted Mountain Goat Herds

1. A Two-Year Study of the Rocky Mountain Goat in the Crazy Mountains, Montana by Jack W. Lentfer, Junior Biologist.

A study of an introduced mountain goat herd was conducted in the Crazy Mountains, southwestern Montana, from March, 1952, 11 years after the first introduction, to October, 1953. Biological comparisons were made between Crazy Mountains goats and goats from the herd which supplied the original stock for introduction. Population data were secured by aerial and ground censuses. The methods are described and compared. Parturition period, kid/adult ratios, and numbers of single kids, twins, and triplets are discussed. Examination for presence of sperm

A complete collection of plants from Scudder Creek and Lost Creek is being made. These plants are being collected at intervals, pressed, keyed out to species, and filed.

Also in connection with the Study of Utilization of plants on these mule deer winter ranges, samples of the stomach contents of deer have been collected at intervals of approximately one month. These samples will be analysed in connection with a food habits study on deer and will be valuable in determining range requirements of deer.

2. The browse on the deer winter range in the Ruby is in similar condition to that on Scudder Creek with much dead and dying mahogany and highlined Mountain Juniper.

Though the winter was unusually open, there were nine deer checked which had died of starvation.

Job IV-B: Range Condition Survey

Over most of the ranges, due to two summers of hot weather and very little moisture, most of the area was dry under last winter's snow. The winter moisture according to information available by snow course measurements was about normal. However, it wasn't sufficient to replenish the two year loss. The ranges at present are mostly late due to slow growing during the month of June when we received considerable amounts of moisture, both in rain and snow. At present with added moisture, the volume of grass will probably be above average, for recent years, in most stations.

Work Plan V: Experimental Range Improvement

Inactive under this project, but included in Project W-37-R-5.

Work Plan VI: Moose Investigation

Job VI-A: Moose Census and Distribution

1. An aerial moose census was conducted in Red Rock Lakes Area. Forty-two moose were counted.
2. An aerial moose census was conducted in the Horse Prairie area. The count by drainage was as follows:

11 - Painter Creek
10 - Trail Creek
6 - Horse Prairie Creek

Further work during the winter included attempts to raise the mushroom plant in question on an agar medium under aseptic conditions. One fungus growth that developed under these conditions looked surprisingly similar to *Penicillium* from which the anti-biotic penicillin is derived. This similarity lead to the addition of anti-biotics to the list of treatments offered this spring in field trials which were located in an area remote from mushroom rings.

Treatments were repeated on the plots on Slide Creek as before. Another similar series was set up in the Crown Butte area where water could be applied to help get the chemicals applied into the soil where they could be absorbed by the plants.

Results of this year's experimentation are not yet available. However in inspecting the testing area of last year it was noted that in areas where extremely high application of nitrogenous fertilizers were applied, increased growth and darker green color of forage was noticeable.

Several additional fertilizer plots were established on the strength of these observations and ammonium nitrate and treble super phosphate fertilizers were applied at a rate equivalent to about six hundred pounds per acre.

Plots receiving the ammonium nitrate have been affected by heavy applications of fertilizer and have responded by producing darker green forage, but volume of production does not seem to have been increased.

Plots subjected to large amounts of treble super phosphate seem to have shown no response whatever. These applications of commercial fertilizers are about double that which has ever been applied here before. Perhaps still larger doses may cause an increase in production of forage on these sites.

Job I-I: Herbarium

No further collection of specimens has been made during the year because the necessary storage facilities are not yet available.

Job I-J: Stomach (Paunch) Analysis

It was hoped that it would have been possible to collect several samples of paunch material from moose, elk, and deer this past winter on the Gallatin. However, numbers of road kills and crippled animals were few, and no animals were reached while still alive or immediately after death, therefore, the paunch sample would not be fit for intensive micro examination, the purpose being

to identify key protozoa and bacteria related to cultures developed on various type feeds. It is possible that this type of study might give a clue as to why an elk when switched from one type feed to another does not have the capacity or ability to digest the new forage.

Work Plan II: Sun River Winter Elk Range

Job II-A: Winter Elk Range Examination

A continuous range examination was conducted on the Sun River Game Range throughout the last winter from November 1, 1953 to April 30, 1954 by Robert Krear. He recorded feeding patterns of elk using various portions of the range, preference of species used, snow conditions, winds and temperatures, elk distribution patterns, and other game use on the range. These observations were supplemented by both ground and aerial photographs taken at intervals through the winter months. This information will appear in the forthcoming report on the Sun River Game Range Forage Inventory.

Job II-B: Photoplot Transects (Trend Study)

Annual fall pictures were taken of the photoplot transects on the Sun River Game Range with the newly acquired 4 x 5 Graphlex camera. These pictures were mounted in chronological sequence with those taken from 1950 on, so that a visual comparison can be made of the changes in the vegetation in the plots through the last four years. Now that the necessary equipment is at hand for this use, more transects will be set out this fall to increase the significance of such a study.

Job II-C: Range (Forage Resource) Survey and Range Survey Methods Research

The intensive clipping program of last fall provided a sound basis of sufficient quantity and quality of data to devise a method by which an elk capacity figure can be obtained for grass-type game ranges. Clipping 1 x 10 foot plots at two-chain intervals was the sampling technique found most satisfactory in sampling the weight of forage produced in the various vegetative types. The proposed plan of coordinating the clipping weight, forage density, and measured basal area so that their respective influences could be obtained was abandoned as too inconsistent to be effective as well as too time-consuming. It was found that measuring the basal area of some types of vegetation was too inconsistent to be reliable, while other easily measured mat-forming plants produced no significant weighable sample.

The voluminous data collected during this work was recorded and compiled during the winter for statistical analysis by the Statistics Department of Montana State College. This analysis is now complete and it shows that the sampling technique used provided sufficient material for figuring the weight of dry forage produced on each important vegetational type represented on the game range.

Other data and information pertaining to this job, such as pictures, maps, charts, weather data, etc., are being assembled for inclusion in the completion report.

Job II-D: Demonstration and Research Exclosures

Construction of the exclosures on the Sun River Game Range was postponed until after completion of the Salmon Lake exclosure on the Blackfoot-Clearwater Game Range. The reason for this delay was to iron out the difficulties encountered with the first exclosure before starting two more.

Work Plan III: Blackfoot-Clearwater Game Range Studies

Job III-A: Forage Evaluation and Nutrition Studies

A complete report on the findings of the last two years of work on the Forage Evaluation and Nutrition Studies is in the process of printing.

Plans for the coming elk feeding trials have been discussed and temporarily accepted and approved by all parties concerned.

Minor constructional changes in the pen arrangement have not been made as yet, and water has not been ditched into the pens. Both of these jobs will be done during the summer.

Job III-B: Salmon Lake Exclosure

Construction of the Salmon Lake Deer Food Study Plot is complete with an attractive explanatory sign erected close to the highway. A turnout or parking area in front of the plot has not been done by the highway crew, but this volunteered job will add to the value of the project.

All copies of data and pictures pertaining to the vegetational cover inside the plot and contiguous to it on the outside have been duplicated and copies are available to those parties who cooperated in this job.

Submitted by:

Name Richard L. Hodder

Title Senior Biologist

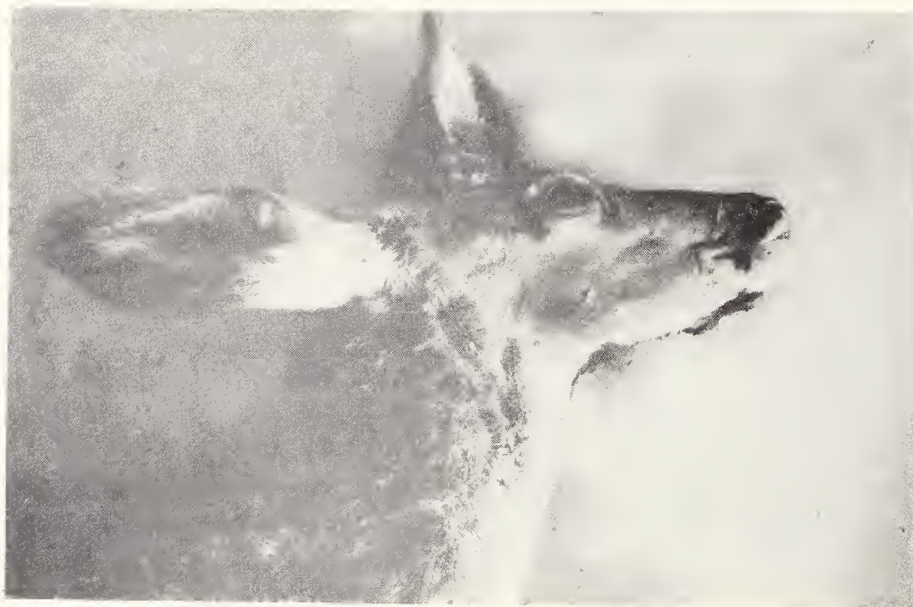
Approved by:

Montana State Department of Fish and Game

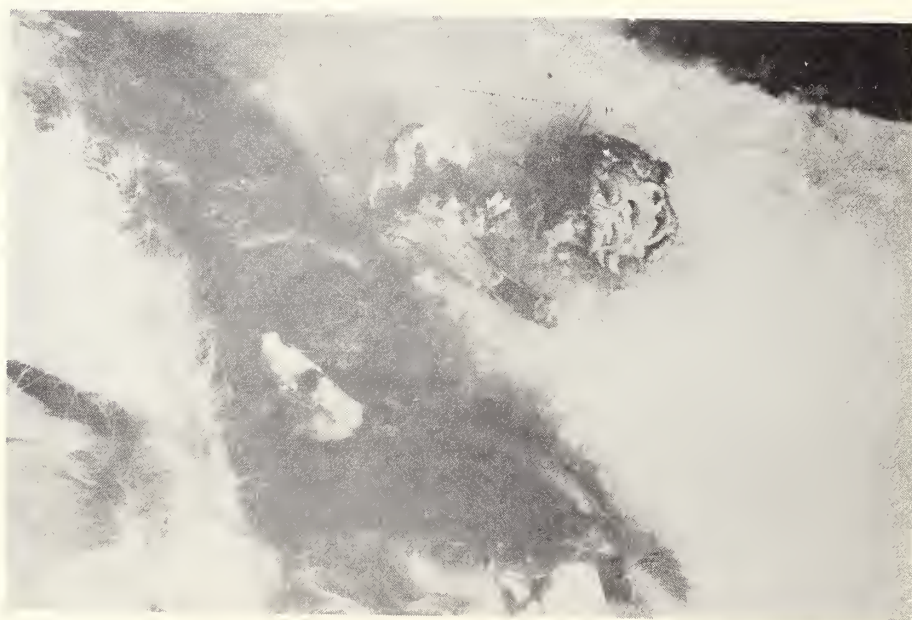
By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Date July 15, 1954



A yearling mule deer collected April 15, 1954 on Scudder Creek. Note hair worn away from face and throat due to browsing in partially dead mahogany shrubs.



A marrow sample from the deer shown above. Though the deer was very poor, the marrow did not denote starvation. Above and to the right of the marrow sample is a portion of the nasal passage showing larvae of deer botfly.



Highlined Mountain Mahogany on Timber
Creek in the Ruby River Area.



A Mountain Mahogany shrub (*Cercocarpus ledifolius*) on Lost Creek showing how heavily it has been browsed by deer.



A Mountain Mahogany shrub on Lost Creek that has been protected by an enclosure for one year. Note abundance of New Shoots.

These 217 animals were from a herd (counted at 717) which was wintering in this basin.

After the hunting season in the fall of 1953, fifteen tags were turned in by hunters. The kill sites were plotted (as nearly correct as possible) on a map.

Taking the terrain into consideration, it isn't too difficult to figure out the obvious route of migration taken by the antelope as they move from their winter range to their summer range and back again.

According to the information now at hand the seasonal distribution of this herd can be summed up as follows: The majority of the herd winters in the central portion of Sage Creek Basin, the exception being these few that winter in the hills just north of Lima. In the spring and early summer the herd begins moving south towards the Red Rock River and up the northern side of the River towards the Centennial Valley. A small number remain in Sage Creek Basin, some remain in the hills above Lima, some remain along the river east of Lima, but the majority of the herd migrates into the Centennial Valley to summer.

In the fall this herd of antelope must, however, move back to the Sage Creek area before they are trapped by deep snow in the Centennial.

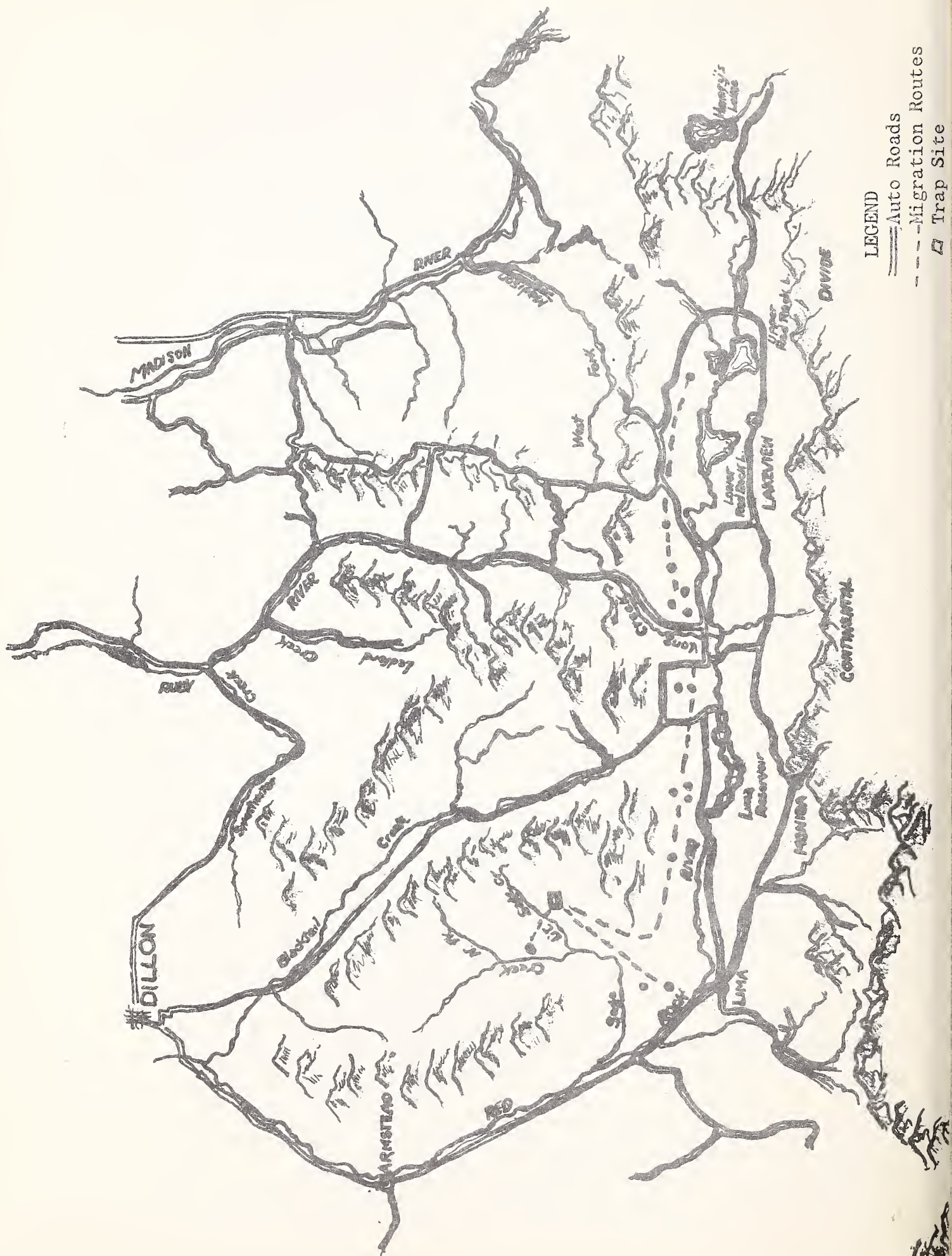
Work Plan IV: Range Inspection and Browse Measurements as well as Transect and Exclosure Observations.

Job IV-A: Forage Utilization on Key Areas

1. Browse measurements were made on browse plants on critical deer winter ranges in the Scudder Creek and Lost Creek areas in the Pioneer Range. Growth and utilization measurements were made on tagged plants both within and without the exclosures. Mountain mahogany, big sage, and Rabbit Brush were the browse species on which measurements were made and recorded.

The browse on Scudder Creek is largely dead or dying mountain mahogany shrubs. The vitality of these shrubs is so low that even those plants within the exclosures produced very little new growth last year.

The browse plants on Lost Creek, however, show good vitality and produced considerable new growth during the last year. The Mountain mahogany in particular even though closely cropped, grew an abundance of new shoots from two to five inches long.



Aerial flight along the deer range on the west side of the Big Belt Mountains indicated a heavy concentration particularly in the Avalanche to Magpie Creek area. These deer spend most of the day feeding on winter wheat fields.

Aerial flight north of White Sulphur supplemented by ground observations indicated a very heavy concentration of deer. The most noticeable overuse is in the Newland Creek area which is about as extensive damage as possible. Mule deer in the Sheep Creek-Eagle Creek area were too dense to count by air without using photographs.

A two-day horseback inspection of the Tenderfoot Creek area indicated an abundance of deer. Although at the time of the inspection deer were widely dispersed, extensive use and sign indicated an over-population. This area is relatively inaccessible to hunters, consequently an either sex harvest starting October 1st, one month ahead of most areas is recommended.

Inspection of the Limestone Hills indicated that last year's harvest reduced the deer in this area to a point where the habitat may show a come-back over a period of years if kept at the present population. Rancher damage has practically been eliminated.

Work Plan II: Big Game Reproduction, Age Classification and Hunter Utilization

Reported in Vol. IV, No. 4

Work Plan III: Study of the Migratory Habits of Big Game in Key Areas

An elk tag was recovered that was held by a hunter since October 15, 1953 - 1 cow elk killed on Stock Creek (Madison) tagged from Yellowstone Park and transplanted in Cougar Creek March 3, 1952. This animal had one hind leg off, probably an injury from the 1952 hunting season. She had to travel over three mountain ranges - air line about 140 miles.

Fifty-seven calf elk were tagged in the West Gallatin. Only a week was spent tagging. Elk were widely scattered. Much of the range was bared of snow that usually retards the migration. Snow and rain storms also made it hard to ride and locate calves.

There were 217 antelope trapped and tagged in Sage Creek Basin, Beaverhead County, on the 27th and 28th of February in the spring of 1953.

Ralph Cooper and Acting Forest Ranger George McLaughlin with a follow-up by Stradley, Pilot, and J. E. Gaab, Biologist, found:

160 elk South Fork of Crow Creek
50 elk Mud Spring
36 elk South of Clasoil

Two aerial censuses by department personnel were made of the Bull Mountain -- Whitetail Creek area: 221 and 231 elk were counted. Adverse conditions by lack of snow cover and the elk having been herded by ranchers and a department herder, made it difficult for an accurate census.

Two aerial censuses were made in the north end of the Big Belt Mountains. The first flight hampered by extreme turbulence indicated a total of 267 elk. A second flight indicated 321 elk. The discrepancy was made in the Rock Creek area.

Jones Hills (Adel)	- 16
Wegner & Stickney Creek	- 36
Wegner & Cottonwood Creek	- 13
Cottonwood & Elkhorn Creek	-154
Rock Creek	-102

Deep Creek-Dry Creek elk

Three aerial attempts were made to make a complete coverage of this area. Turbulence in each case made complete coverage impossible. The elk evidently did considerable moving around making it impractical to list an accurate census: large bands were counted in one area on the flight and not the other. However, it is believed that there are approximately three hundred elk in the Deep Creek to Sixteen-mile Creek area.

Two days were spent in the Deep Creek area riding the range and attempting to determine a spring distribution pattern. Very little spring sign was located on the north side of Deep Creek. It is felt that the activity of domestic livestock has discouraged use by elk in this area.

Deep Creek Deer

Aerial coverage of lower Deep Creek Canyon indicated a moderate distribution of deer over the large area available this winter. The same population concentrated into a lesser area during a usual winter would overpopulate the lower extremities of the range. The concentrations in the North Fork are still causing considerable damage to native habitat and damage to private land.

8	- Pony Creek
39	- Walker Creek
694	Total

Job I-J: Big Game Survey - Crazy Mountains Area

An aerial inspection of the Crazy Mountain deer (East side) was made. The concentration of deer north of Sweetgrass Creek is far in excess of good management practices both from the range use and range tolerance aspects. The deer south of Sweetgrass Creek have been reduced by a two weeks either sex season. Large bands of deer out on private range were not observed as they have been in past years, such is still the case north of Sweetgrass Creek. A uniform season is recommended.

Job I-K: Big Game Survey - Big Belt - Boulder Area

White Sulphur Antelope aerial census (Hunter Map Area No. 9) 185 antelope - 35 Birch Creek. Whitehall Antelope Aerial Census:

34	- West of Siedensticker Ranch
49	- SW of Davis Ranch
21	- Little Whitetail
21	- Elkhorn Creek
16	- Dunn Canyon
29	- Cottonwood Creek
68	- Lewis & Clark Game Preserve
31	- Waterloo Area
92	- Nigger Hollow

Townsend-Toston Antelope Aerial Census:

230	- Winston Flat
70	- North of Toston - Radersberg Road
58	- South of Toston - Radersberg Road
49	- Missouri Valley (East)

White Sulphur Antelope Aerial Census:

185	- North
35	- Birch Creek

Castle Mountain elk aerial survey - 240

The concentrations were in Willow-Checkerboard and Cottonwood Creeks. A spring aerial survey to determine the distribution during the calving period indicated that the elk were more dispersed but at about the same wintering elevation.

Crow Creek elk aerial survey included the entire Elkhorn Unit (Forest) made by Fish & Game Department pilot

277	-	East Fork of Blacktail
160	-	West Fork of Blacktail
195	-	Middle Fork of Blacktail
213	-	Robb Creek and Ledford Creek
123	-	Blacktail Ridge
<u>161</u>	-	Clarks Canyon
1,129		Total

Job I-H: Big Game Survey in Beaverhead River Area

1. Beaverhead River antelope census job completion report attached.
2. Aerial elk census in Lima Hills
205 elk were found wintering from Beaver Creek to Little Sheep Creek.
3. Approximately 100 elk were counted in the Highlands after the 1953 season. Forty-eight elk were later planted to bring the number up to the agreed 150 head.
4. The Canyon Creek elk were counted in late January. 209 elk were counted from Vipond Park to cattle gulch.
5. 110 elk were counted in the Centennial area south of Patch Top Mountain.
6. Twenty-nine elk were counted on McCartney mountain.
7. Eighteen elk were counted in Medicine Lodge.
8. One hundred elk were counted on Bloody Dick Creek.
9. Sixteen elk were counted on Painter Creek.
10. Twenty-eight elk were counted on Dutchman Mountain.

Job I-I: Big Game Survey in the Big Hole - Wise River Area

1. The numbers of elk counted wintering in the Big Hole, Fleecer and High Rye areas are listed by area as follows:

72	-	Grasshopper Big Hole Divide
45	-	Warm Springs Creek
17	-	East of Wisdom
28	-	Squaw Creek
53	-	East side below Squaw Creek
187	-	High Rye
213	-	Fleecer Mountain and Charcoal Basin
7	-	Jerry Creek
25	-	Granulated Mountain

like them removed. The Warden force has driven them out of the immediate area several times.

Aerial census of the Harrison Lake - Willow Creek
antelope - 195
Aerial census of elk east side Madison by Warden
Supervisor and Deputy Warden Todd - 320 elk
Aerial census of elk west side Madison -
76 West Fork Madison
97 Wigwam Creek
90 Horse Creek to Morgan Gulch

The extended either sex elk season on the west side of the Madison has alleviated the damage to private property. The elk remaining in that area (90) are in small groups and well distributed even to high elevations. The 97 in Wigwam Creek may be a part of the troublesome elk that have moved further down the divide supplemented by elk that have wintered in Warm Spring Creek on the Ruby River in the past.

Thirty elk were located in Hot Spring Creek on the east side of the Tobacco Root Mountains and seven plus on North Willow Creek.

No organized deer census was made in the Madison area where we have had extended either sex seasons. Aerial coverage indicates there are sufficient numbers but that the population has been reduced. The two past winters being quite open in the Madison Valley probably has contributed to the lessened damage to private property.

Job I-F: Big Game Survey in Ruby

1. An aerial elk census on the Upper Ruby River was made on March 2 and 80 elk were observed:

49 - Warm Springs Creek
31 - Barton and Idaho gulch area

2. An aerial check was made on deer in the Warm Springs Creek drainage. The count for this area was 488.

Job I-G: Big Game Survey in Blacktail

1. An aerial elk census was conducted in the Snow Crest mountains and Blacktail Ridge. The area was covered during the latter part of February and the first part of March. The count, listed by areas, is as follows:

The Gallatin Game Range (Porcupine Ranch) provided forage for about two hundred and fifty elk during the critical months.

A joint examination of the elk winter range outside Yellowstone Park was made by Mr. Urquhart, Supervisor of the Gallatin National Forest and J. E. Gaab, Fish and Game Department Biologist, supplemented by findings of Mr. Richard Hodder, Range Biologist for Fish and Game Department, indicated that the upper Porcupine range was used the most extensively. It was concluded that this use was detrimental to that range. The distributed use pattern over the other wintering areas was not determined as detrimental for this past year. A January 2 aerial survey indicated 522 elk counted in the Porcupine area, 457 in the Tepee area and 389 in the Taylor Fork area--the three heaviest concentration areas.

A ground-squirrel control program has just been completed in the lower basin area from Buck Creek to the West Fork of the West Gallatin River by the Fish and Wildlife service, private landowners, and assisted by the Fish and Game Department.

Increasing numbers of deer are observed in the West Gallatin Canyon. The population is light and the area doesn't provide a great deal of deer habitat in competition with elk. During the month-long buck season 117 animals were taken above the Squaw Creek checking station. During the three-day hunter's choice season fifteen antlerless deer were harvested.

Deer investigations along the west side of the Bridger Mountains indicate a reduction of deer, but not a great deal of improvement in the range. Haystack damage is lessened. The deer in the Gallatin Game Preserve particularly in the Sixteen-Mile drainage are abundant, management must be applied or the deer will die off and take the range with them.

Forty-four antelope were counted by air in the Dry Creek area. They originated from a plant of sixty-seven in 1946-1947. Game wardens report poaching in this herd.

(West Gallatin Calf Elk tagging see Work Plan III)

Job I-E: Big Game Survey in Madison

An aerial census of the antelope in the upper Madison made by Warden Supervisor Sherman and Deputy Warden Todd indicates 192 antelope. Twenty-nine of these antelope planted east of Meadow Lake have become troublesome to Mr. Watkins who would

Job I-D: Big Game Survey in Gallatin

A third elk season in the Gallatin was recommended in a limited area following investigations early in January that indicated an abundance of elk. The first trail over the divide from the Gardiner River side through Fawn Pass and down the Gallatin was seen this year and was perhaps an explanation for the increased number of elk in the Gallatin. The total harvest amounted to 770 elk.

One very interesting finding through the checking station information is that during the last two heavy harvests of elk in the Gallatin, the sex ratio has a greater spread than over a long time average in previous years. The previous long time average indicated a very close 1 to 1 sex ratio at harvest. The more recent findings are in 1951, 40.5% males to 59.5% females of the total harvest, in 1953, 37% males to 62.9% females of the total harvest. This is at least in part an explanation why a sex ratio from field observations of 1 to 1, the same as the animals are born, cannot be obtained.

The best census of the Gallatin elk before any migration into the Madison was 2,106 in the Gallatin drainage above Squaw Creek. The January 9th through 17th, 1954, season harvested about three hundred elk considering loss of cripples and etc. A winter loss of fifty head occurred. A known migration into the Madison of 125 leaves a calculated number of elk wintering in the Gallatin of about 1,631. These elk weren't ever counted although a couple of attempts were made. When the elk were dispersed on the winter range, counting conditions were very poor; some elk wintered in the timber and were not forced out due to snow crust until a lot of bare ground showed making it ineffective counting.

The elk distribution pattern was exceptional this past winter. Wintering conditions for elk were very advantageous until a thaw occurred in early March crusting the snow and baring a very limited amount of range. The bared areas were ridge tops of low forage density and areas of heavy use. At this time experimental feeding to attract the elk off the so-called "sore spots", especially in Porcupine Creek, was started. By feeding a sufficient amount of hay and pellets on the snow areas and in the timber to satisfy the elk's appetite, they remained off the bare slopes, consequently lessening damage to those areas by not trampling over them.

high cost of the helicopter operation.

Mule deer ranges and populations were investigated along the Yellowstone River. The area north of the Park has excessive numbers of deer. The deer are mostly migrants from Yellowstone Park. These deer can only be harvested later than the regular mid-season short either sex season. They are browse lining some of the preferred browse species on a range set aside by the National Forest as elk range. Light use by elk with the browse lining by deer makes the range appear in poor condition for elk. A good deal of damage is done to privately owned hay fields by deer, especially in the early spring when the alfalfa is green. The Big Creek - Mill Creek ranges this year got some relief because deer were dispersed due to the light winter. Antelope Butte was probably the highest concentration. Even the extended season on the Mill Creek area, with some relief to the local ranches, probably will not lessen the entire picture during a normal winter. Longer either sex seasons are recommended.

Total harvest of Yellowstone elk, including the early season in the wilderness area - 422 elk.

Elk from Yellowstone Park migrated to the Forest range late in the season. There were about one thousand head mostly concentrated from Trail Creek to Bear Creek. The native herds in the lower Yellowstone aren't building up very fast with protection. Evidence of poaching was found by game wardens.

Assistance was given to the antelope trapping operation to reduce the Yellowstone Park population.

One hundred and eighty-five antelope were counted by air in the Mission Creek area. These antelope originated from a transplant made in 1947-1948 of sixty-six. Last year the season was opened for twenty-five bucks by special permit holders.

Shields River - Sixteen Mile Creek antelope:

Upper Shields River	69
Sheep Mountain	37
N. W. Ringling	38
S. W. Ringling	<u>36</u>

Total 180 aerial census

Aerial investigation of the deer distribution in the Shields River area indicated a moderate population. Rancher complaints have been minimized by previous either sex seasons.

- b. East Rosebud Canyon - Deer numbers are moderate and range has not been overused.
 - c. Butcher Creek - A small concentration area was observed from the air.
- 8. West Fork Rock Creek - Moderate deer numbers. Sagebrush which made up most of the available browse had received moderate to heavy use, chokecherry had received heavy use.
 - 9. Rock Creek - Sagebrush showed heavy past use and moderate to heavy current use; chokecherry showed heavy utilization.
 - 10. Pryer Mtn. - A very low population of deer considering availability of forage.
 - 11. Countrymen Creek - A moderate number of deer were present, juniper showed moderate past use and light current use, chokecherry which is not abundant has received heavy past use and fairly light current use. Sagebrush showed little or no use.

Job I-B: Big Game Survey in Absaroka Wilderness Area

On April 26, we flew 1,200 pounds of salt just south of the Absaroka Wilderness Area along the north boundary of Yellowstone Park. The purpose was to hold elk along the boundary on intermediate range until range in the primitive area opens.

On June 26, we flew 1,200 pounds of salt into the wilderness area. This is an attempt to attract elk from Yellowstone National Park into this area to better hunting in the fall. In past years salt was spread at intervals along migration routes to summer range and on summer range. This has encouraged about four hundred elk into the area. However, some salt along the migration route tends to hold elk in the vicinity of the Yellowstone Park boundary, and they drift into the Park for protection early in the hunting season. This year salt was concentrated on the summer range only, attempting to hold the elk further into the wilderness area.

Job I-C: Big Game Survey in Upper Yellowstone

The experimental hazing to herd elk out of Yellowstone Park into open hunting territory did not prove to be a solution to the problem. Men on foot and horseback and airplane hazing met with no success. The helicopter aided by an airplane was the only successful way to move the elk in a different direction from where they wanted to go. This method is prohibitive due to the

3. An aerial investigation was made in the vicinity of Mt. Rae between the mouth of the West Boulder River and the Boulder River to observe deer populations and to attempt to locate mountain sheep. Mule deer were observed in large groups near the base of the mountains and along the river bottoms and haystack damage was obvious. No mountain sheep were observed.
4. During the same flight mentioned above, the deer concentration between the East and West Rosebud River was observed. The deer in this area have been reduced considerably, and weren't ranging as far into the foothills as in previous years.
5. Stillwater deer investigations:
 - a. Below Nye - Deer numbers were moderate with no overuse of range evident.
 - b. Meyers Creek - The small amount of browse available to deer in the area showed definite overuse. Chokecherry had received severe overuse.
 - c. Castle Creek - Chief browse species all receiving heavy to severe past and current use were sagebrush (Artemesia tridentatia), juniper (Juniperus horizontalis) and chokecherry. Some of the juniper and chokecherry had been killed by overutilization. Deer numbers were high. Eighty-nine were counted in one group.
 - d. Picket Pin Creek - Predominant browse species: Sagebrush and Juniper. Sagebrush has received severe use, many plants are dead; juniper showed overuse, deer numbers high, groups of 25 to 40 were common.
 - e. Main Stillwater above Nye - Deer abundant in this area, browse species have received heavy past use and moderate to heavy current use. Three mountain lion were killed in this area this year and two others seen.
6. West Rosebud deer investigations:

Heavy deer concentrations were noted in the thirteen miles of canyon below the power plant. Sagebrush, one of the chief browse species, had received heavy use. Juniper and Ceanothus received heavy use. Chokecherry has had heavy to severe utilization. Tracks of five lions were seen between East and West Rosebud Rivers.
7. East Rosebud deer investigations:
 - a. Willow Creek - Browse species showed severe past use and heavy current use. This included Ceanothus, chokecherry, juniper (J. Communis), and sage.

QUARTERLY PROGRESS REPORT FOR

INVESTIGATIONS PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Southwestern Montana Unit
2. Personnel: J. E. Gaab, Senior Big Game Biologist, Leader
Philip South, Junior Biologist
Norman Wortman, Fieldman
Jack Lentfer, Fieldman (one month)

3. Report of Progress:

Work Plan I: Big Game Population and Range Trends

Job I-A: Big Game Survey of the Beartooth Plateau

1. Aerial census of elk in the Red Lodge area;
146 elk were observed in Rock Creek to Line Creek. Trapped elk from Yellowstone Park were replaced to bring the total elk for the area up to the agreed 200 carrying capacity for the area.
2. Mountain sheep trapping on Stillwater River:
The antelope trap was set up around an old established salt ground. Thirty-two sheep feed every clear day in the immediate vicinity of the trap. The trap did not frighten the sheep, and they continued to use the salt. Only one or two sheep would enter the trap at a time. The trap being approximately thirty feet by sixty feet would allow adequate space for the entire band to enter and still not be too confining. No sheep were trapped. It was hoped that they would gradually enter the trap in larger numbers, and one catch would make up a transplanting group. This likely could have been accomplished if the trap could have been left up until the sheep had greener grass to forage upon and become more salt-hungry. The trap had to be used for other purposes before green grass started.

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QUARTERLY PROGRESS REPORT
For The
WILDLIFE RESTORATION DIVISION
STATE OF MONTANA

FISH AND GAME COMMISSION

Chairman - Walter Banka, Conrad

Mason H. Bailey, Jr., Glasgow
J. W. Black, Polson

R. D. Shipley, Miles City
William T. Sweet, Butte

State Fish and Game Warden

- A. A. O'Claire

Chief Deputy

- W. J. Everin

Director, Wildlife Restoration Division

- R. F. Cooney

Volume V Number 2
April, May and June

1954

STATE	Montana
PROJECT NO.	W-39-R-5
DATE	July 15, 1954
VOL. V	NO. 2

Title of Project: Waterfowl Survey and Investigation

Leader: Gerald Salinas

Job Completion Report

Job No. I-A

Investigations Project

Title of Job: Aerial Waterfowl Census

Weather and Water Conditions

Montana experienced another open winter. Unseasonably warm weather occurred during February and most of March. Warm temperatures and chinook winds greatly reduced the existing snow cover throughout the State. Much of the moisture of later snows was absorbed by soil relatively free of frost. These conditions reduced surface run off water, and produced fewer potholes in the Flathead Valley and the Great Falls Piedmont.

The late snows in the central and eastern Hi-line were heavier than in the above regions and remained on the ground for an extended period. This precipitation resulted in a 107 percent increase in numbers of potholes in the east and central Hi-line region. (See Table I.)

Early spring weather produced a sharp contrast. A cold wave appeared during the last week of March and the first of April. In the Great Falls Piedmont region, temperatures were below zero with snow cover. This severe condition provided a definite hardship on migrating waterfowl. There were losses among both ducks and snow geese in this migration route, extending fifty miles east of the Rockies. For a week the most readily available food was in ranch feed lots. Most of the losses were reported from these areas.

An unusually heavy migration of pintails, both east and west of the Continental Divide, was observed this spring.

During the months of May and June, precipitation and temperatures have been near normal.

Table I. Comparative water areas observed over same aerial routes during the 1953 and 1954 breeding ground censuses

Physiographic Area	Reservoirs		Potholes		Totals	
	1953	1954	1953	1954	1953	1954
East Hi-line	40	50	107	180	147	230
Center Hi-line	70	73	148	348	218	421
Great Falls Piedmont	76	81	163	119	239	200
					604	851

Breeding Populations

Aerial census routes were again flown in order to establish the breeding population trend. These identical routes have been censused for the past six years.

There was a 35.6 percent increase in the total waterfowl population over the 1953 high. (See Table I.) The population has been increasing in the census area since 1951. The 1954 population indicates a 77.9 percent increase over the 1951 population level. The aerial trend population was calculated to be 345,700 birds in the Hi-line and Great Falls Piedmont areas. These areas constitute the major waterfowl habitat in the State.

Table II. Waterfowl populations as determined from aerial census routes

Physiographic Area	App. Size of Area	Birds/Sq. Mi.		Population Est.		Diff.
		1953	1954	1953	1954	
Sheridan County	1,440	39.4	57.5	50,256	82,800	+ 32,544
East Hi-line	7,920	5.2	7.1	41,184	56,232	+ 15,048
Center Hi-line	9,468	11.5	15.6	108,882	147,700	+ 38,818
Great Falls Piedmont	7,020	7.9	8.4	55,458	58,968	+ <u>3,510</u>
				Increase or 35.6%		89,920

Trend areas flown in the area south of the Missouri River show the population to be approximately the same in 1954 as it was in 1953. It is not expedient procedure to attempt a population estimate in this area. The majority of the water areas are artificial reservoirs, and these are widely scattered. "The average distribution of the ponds is about one per four square miles." (Smith, Richard H. A study of waterfowl production on artificial reservoirs in Eastern Montana. Journal of Wildlife Management Vol. 17, No. 3)

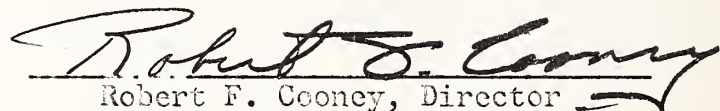
Regional Director
Fish and Wildlife Service
Interior Building
1001 N. E. Lloyd Blvd.
Portland 14, Oregon

Dear Sir:


We are herewith submitting a Quarterly Progress Report in connection with the projects carried out through use of Federal Aid in Wildlife Restoration funds.

The coverage is for the period April, May and June, 1954.

Submitted by:


Robert F. Cooney, Director
Wildlife Restoration Division

Approved by:


A. A. O'Claire
State Fish and Game Warden

The waterfowl census of the trend areas in the western mountainous region was not run in 1953. However, the 1954 data indicate an approximate increase of twenty percent over the 1952 level. This would indicate, by interpolation of statewide information, that a considerable increase was made over the 1953 population. The exact amount of this increase cannot be determined.

Canada goose production in the Flathead Valley was reduced by approximately one-third from the 1953 production of 821 goslings.

Production

Weather and water conditions have been excellent for production in the Hi-line area since the start of the nesting season. At this date, the average brood size is 1.2 ducklings larger than brood counts for a similar period during the previous year. The important species contributing to this brood count and the average size of their broods are as follows:

Mallard	5.7
Pintail	5.8
Baldpate	7.0
Shoveler	9.0
Blue-winged teal	9.3

The preponderance of Class I broods in the sample of blue-winged teals and shovelers accounts for the larger average size of these broods.

This year has seen Montana Fish and Game Department's largest single effort in Canada goose banding. Through cooperation with Fish and Wildlife personnel, 1133 geese were banded in the following areas:

Ennis Lake	243
Bowdoin Refuge	325
Nelson Reservoir	147
Ninepipe and Pablo Refuges	272
Flathead Lake	<u>146</u>
Total	1133

Summary

Waterfowl breeding populations are up 35 percent to an estimated total of 345,700 birds in the most important areas of the State--the Hi-line and the Great Falls region. Production in these areas has also increased. Other areas in the State showed essentially the same population of birds. This increase in population and production appears largely attributable to favorable weather and water conditions.

This spring, there has been a 107 percent increase in pothole numbers in the Hi-line. This is the third successive year that Montana has had favorable water conditions in the Hi-line area.

Prepared by:

Name Gerald Salinas

Date July 15, 1954

Approved by:

Montana State Department of Fish and Game

By Wynn G. Freeman, Assistant Director

Wildlife Restoration Division

STATE	Montana	
PROJECT NO.	W-49-R-3	
DATE	July 15, 1954	
VOL.	V	NO. 2

Title of Project: Fur Resources Surveys and Investigations

Leader: Fletcher E. Newby

Job Completion Report

Job No. I-A

Investigations Project

Title of Job: Annual Yield and Income from the Fur Resources as Determined by Examination of Fur Dealer Records - 1952-53 Season

Objectives: Determination of annual yield and value of the fur resource as basic information in the management of the fur resource.

Techniques Used: Record books of most fur dealers and fur dealer's agents in the state were inspected by biologists of the fur resources section. Additional data on the transactions of certain small dealers were obtained from the records of larger fur houses who purchased furs from them. Records of other dealer sales and most out-of-state sales were found in the shipping permit records of the Fish and Game Department. Fur dealers in Idaho Falls, Idaho and Minot, North Dakota were interviewed regarding purchases of furs taken in Montana.

Data from the sources described were recorded in numerical code on prepared forms. Since the trapper's address was the only basis for designating the county of capture, it was recognized that this method would frequently fail to place the locality of capture in the correct county. In an effort to make comparisons of fur production in different areas and to minimize the errors present at the county level, the state was divided into eight districts, each including several counties with similar economic and biologic characteristics (Figure 1).

Data for the calculation of average prices were secured from dealer's records. In general, excellent cooperation was received.

Preliminary tabulation of the data was accomplished through use of IBM electric accounting machines.

Findings: Tabular summaries of the data appear in Tables 1 through 9A. Data in Table 1 are compared with information from 1952-53 Trapper's Reports (Wildlife Restoration Quarterly Report, January - March, 1954) for purposes of evaluation.

MONTANA.

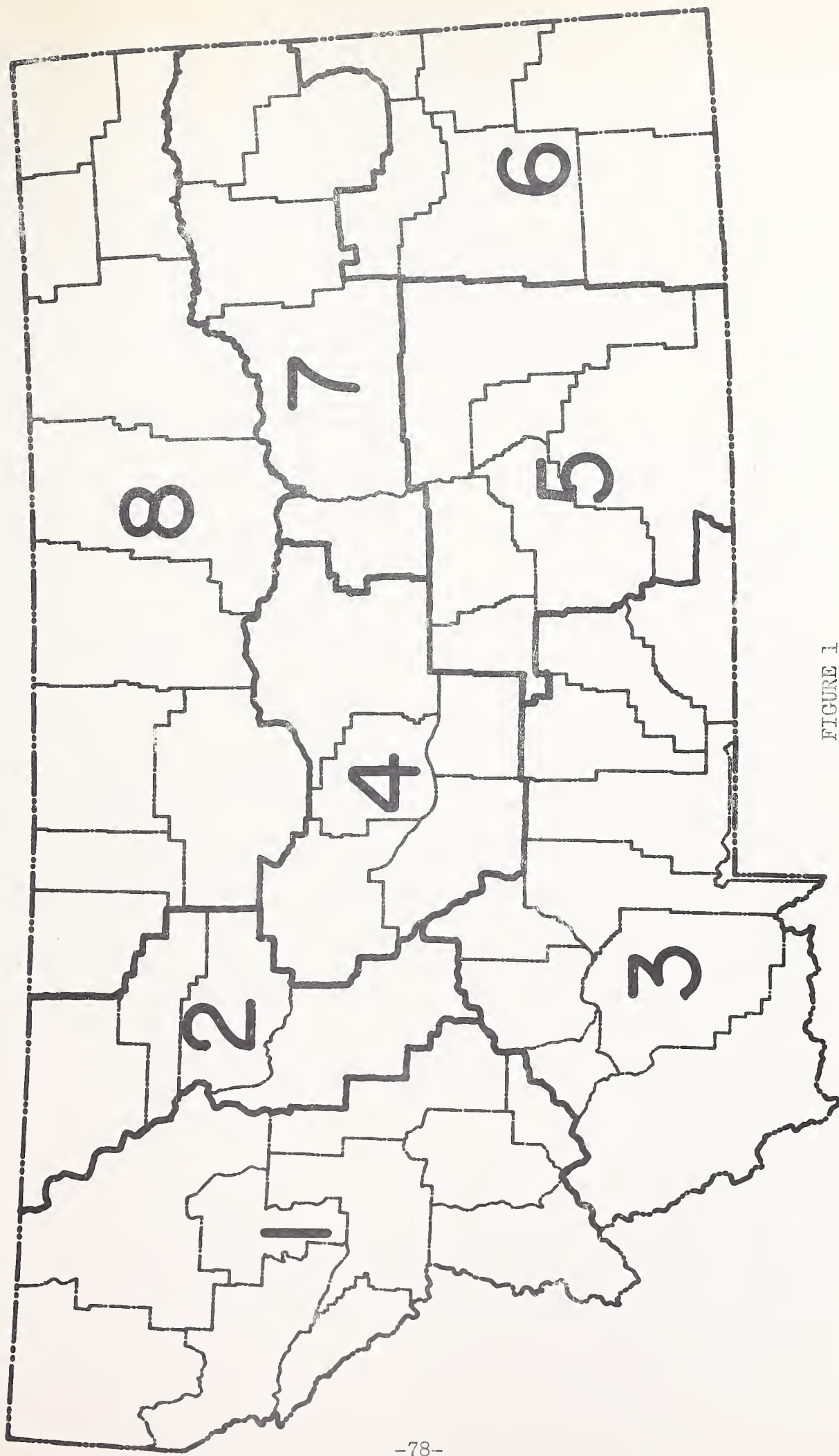


FIGURE 1

FUR DISTRICTS

TABLE 1* YIELD OF 1952-53 TRAPPING SEASON, DISTRICT AND STATE-WIDE
COMPARISON OF TRAPPER REPORT AND FUR DEALER RECORD** DATA

Fur District	1		2		3		4		5	
	TR	FD	TR	FD	TR	FD	TR	FD	TR	FD
Mink	1,511	1,602	610	509	1,707	2,272	1,358	1,366	557	236
Muskrat	27,874	21,594	3,512	3,654	14,977	12,829	7,318	5,761	4,090	4,238
Beaver***	2,654	2,654	874	874	2,351	2,351	1,806	1,806	543	543
Weasel	701	385	235	134	520	225	285	200	84	66
Bobcat	201	30	108	47	251	119	110	99	163	255
Skunk	145	8	229	108	478	136	510	562	145	79
Coyote	93	7	10	13	39	17	16	14	0	4
Raccoon	2	0	77	0	42	2	10	2	151	90
Badger	17	0	5	1	39	5	21	10	25	13
Fox	6	18	0	0	0	0	0	0	0	0
Canada Lynx	2	0	0	0	0	0	0	0	0	0
Wolverine	2	0	0	0	0	0	0	0	0	0
Totals	33,208	26,298	5,660	5,340	20,404	17,956	11,434	9,820	5,758	5,524
% Total	38.0	35.8	6.5	7.3	23.4	24.5	13.1	13.4	6.6	7.5

* Continued on next page

** Does not include Indian-caught furs

*** From tagging records, does not include Indian-caught beaver

TABLE 1. (Continued)

YIELD OF 1952-53 TRAPPING SEASON, DISTRICT AND STATE-WIDE
COMPARISON OF TRAPPER REPORT AND FUR DEALER RECORD DATA

Fur District	6			7			8			MONTANA TR			MONTANA FD			Av. Price
	TR	FD	TR	FD	TR	FD	TR	FD	No.	Value	No.	Value	No.	Value	Price	
Mink	129	63	152	177	824	620	6,848	6,848	6,848	\$95,255.68	6,845	\$95,145.50	6,845	\$95,145.50	\$13.90	
Muskrat	113	47	463	295	6,386	5,245	64,733	64,733	64,733	60,849.02	53,663	50,443.22	53,663	50,443.22	.94	
Beaver	455	455	319	319	934	934	9,936	9,936	9,936	95,484.96	9,936	95,484.96	9,936	95,484.96	9.61	
Weasel	14	2	112	15	157	259	2,233	2,233	2,233	1,965.04	1,161	1,021.68	1,161	1,021.68	.88	
Bobcat	40	26	15	4	39	23	927	927	927	1,121.67	610	738.10	610	738.10	1.20	
Skunk	125	2	45	38	288	38	1,965	1,965	1,965	1,788.15	971	873.90	971	873.90	.90	
Coyote	0	0	0	0	38	1	196	196	196	437.08	56	124.88	56	124.88	2.23	
Raccoon	58	8	33	6	0	0	373	373	373	488.63	108	141.48	108	141.48	1.31	
Badger	11	6	10	4	26	4	154	154	154	106.26	43	29.67	43	29.67	.69	
Fox	0	0	0	0	0	0	6	6	6	7.50	18	22.50	18	22.50	1.25	
Canada Lynx	0	0	0	0	0	0	2	2	2	10.00					5.00	
Wolverine	0	0	0	0	0	0	2	2	2	40.00					20.00	
Totals	945	609	1,149	858	8,692	7,124	87,381	\$257,553.99	73,411	\$244,025.89						
% Total	1.1	0.8	1.3	1.2	9.9	9.7	100.0		100.0							

TABLE 2.

1952-53 BEAVER TAKE

Fur District No.	Fish & Game Dept. Tagging Records		Trapper Report Card Data		Fur Dealer Record Data	
	No. of Pelts	% of Total	No. of Pelts	% of Total	No. of Pelts	% of Total
1	2,654	26.6	2,012	24.3	2,110	26.0
2	874	8.8	627	7.6	831	10.3
3	2,351	23.7	1,850	22.4	1,310	16.1
4	1,806	18.2	1,846	22.3	1,482	18.3
Western Mont.	7,685	77.3	6,335	76.6	5,733	70.7
5	543	5.5	1,035	12.5	951	11.7
6	455	4.6	195	2.4	389	4.8
7	319	3.2	214	2.6	235	2.9
8	934	9.4	495	6.0	805	9.9
Eastern Mont.	2,251	22.7	1,939	23.5	2,380	29.3
TOTAL	9,936	100.0	8,274*	100.0	8,113	100.0

* 2305 additional beaver were taken by landowner permittees for a total of 10,579. See Table 9.

TABLE 3.

AVERAGE INCOME TO INDIVIDUAL TRAPPER, 1952-53 SEASON
COMPARISON OF TRAPPER REPORT AND FUR DEALER DATA

Fur Districts	1	2	3	4	5	6	7	8	MONTANA
No. Trappers	374	99	334	174	70	31	35	164	1,281
Av. Ind. Income FD	\$198	186	212	238	172	142	152	122	193
Av. Ind. Income TR	\$213	194	198	246	232	180	154	145	202

TABLE 4.

THREE YEAR SUMMARY OF THE FUR TAKE*

	1950-51			1951-52			1952-53			1281 Trappers			Summary	
	No. of Pelts	Av. Price	Total Value	No. of Pelts	Av. Price	Total Value	No. of Pelts	Av. Price	Total Value	No. of Pelts	Av. Price	Total Value	No. of Pelts	Total Value
Beaver	13,317	\$15.83	\$210,808.11	9,827	\$10.01	\$98,368.27	9,936	\$9.61	\$95,484.96	33,080		\$404,661.34		
Coon	8,590	18.79	161,406.10	6,060	15.41	93,384.60	7,295	13.90	101,400.50	21,945		356,191.20		
Muskrat	53,243	1.58	84,123.94	47,283	1.00	47,283.00	59,373	.94	55,810.62	159,899		187,217.56		
Marten	1,462	20.23	29,576.26	884	15.49	13,693.16				2,346		43,269.42		
Weasel	1,632	1.18	1,925.76	1,230	.89	1,094.70	1,245	.88	1,095.60	4,107		4,116.06		
Bobcat	461	2.05	945.05	363	1.72	624.36	621	1.20	745.20	1,445		2,314.61		
Skunk	772	.91	702.52	248	.73	181.04	1,019	.90	917.10	2,039		1,800.66		
Coyote	147	1.30	191.10	14	1.13	15.82	57	2.23	127.11	218		334.03		
Raccoon	195	1.07	208.65	72	1.00	72.00	109	1.31	142.79	376		423.44		
Badger	40	.85	34.00	27	.82	23.76	43	.69	29.67	110		87.43		
Fox	23	2.09	48.07	5	1.25	7.50	18	1.25	22.50	46		78.07		
Canada Lynx	2	12.50	25.00	5	5.00	25.00				7		50.00		
Wolverine	1	20.00	20.00							1		20.00		
TOTALS	79,885		\$490,014.56	66,018		\$254,773.21	79,716		\$255,776.05	223,619		\$1,000,563.82		

* Compiled from fur dealer and shipping permit records, except marten and beaver take from tagging records.
Includes furs taken by Indians, except beaver.

TABLE 5.

MONTHLY DISTRIBUTION OF TRAPPER SALES AND
MONTHLY VARIATION IN AVERAGE PRICES--MINK AND MUSKRAT

	MONTHLY SALES		% OF TOTAL SALES		AVERAGE PRICE	
	Mink	M'rat	Mink	M'rat	Mink	M'rat
November	997	3,247	13.7	5.5	\$15.15	\$.78
December	3,794	6,949	52.1	11.8	16.34	.77
January	1,353	3,766	18.6	6.4	13.17	.77
February	236	778	3.2	1.3	8.26	.84
Sub-total	6,380	14,740*	87.7	24.9	15.27	.78
March	309	15,208	4.3	25.7	5.97	1.00
April	407	22,143	5.6	37.5	5.23	.97
May	145	5,928	2.0	10.0	4.99	1.00
June	33	1,087	0.5	1.8	4.84	.94
Sub-total	894	44,366	12.3	75.1	5.44	.98
TOTAL	7,274	59,106	100.0	100.0	\$13.90	\$.94

* A portion of these sales are muskrats taken legally in a November 10 to December 31 season in certain irrigation districts.

TABLE 6.

COMPARISON OF AVERAGE PRICES RECEIVED BY WHITE AND
INDIAN TRAPPERS - 1952-53

FUR DISTRICT NO.		MINK	M'RAT	BEAVER
1	White	\$14.64	1.01	10.87
	Indian	6.96	.83	6.26
2	White	13.75	.94	9.71
	Indian	11.10	.65	5.60
5	White	14.53	.87	8.25
	Indian	12.13	.74	6.76
8	White	14.13	.75	7.59
	Indian	10.08	.77	8.31

TABLE 7.

AVERAGE PELT PRICES - DISTRICT AND STATE-WIDE
1952-53 SEASON

	1	2	3	4	5	6	7	8	MONTANA
Mink	14.49	12.83	13.99	13.90	13.92	*	*	13.27	13.90
Muskrat	1.00	.83	1.02	.92	.86	*	.82	.75	.94
Beaver	10.80	8.94	10.81	9.09	8.08	7.55	7.95	7.65	9.61

*District samples insufficient to obtain accurate average price.

TABLE 8.

OUT-OF-STATE SALES

	Total sales	Out-of-state sales	Percent of total
Mink	7,288	1,142	15.7
Muskrat	59,373	4,712	7.9
Beaver	8,113	954	11.8
Weasel	1,245	120	9.6
Bobcat	621	8	1.3
Skunk	1,019	26	2.6
Coyote	57	3	5.3
Raccoon	109	54	49.5
Badger	43	8	18.6
Fox	18	0	0.0
	77,886	7,027	9.0

TABLE 9.

ANALYSIS OF 1952-53 BEAVER TAKE BY TRAPPER TYPE

Fur District	General Trapper		Landowner* Trapper		Beaver Permittees**		Total
	No.	% of Total	No.	% of Total	No.	% of Total	
1	1729	69.6	283	11.4	471	19.0	2483
2	476	55.6	151	17.6	229	26.8	856
3	1500	65.7	350	15.3	433	19.0	2283
4	1588	67.9	258	11.0	493	21.1	2339
Western Mont.	5293	66.5	1042	13.1	1626	20.4	7961
5	972	86.6	63	5.6	87	7.8	1122
6	99	23.1	96	22.4	234	54.5	429
7	184	50.0	30	8.2	154	41.8	368
8	390	55.8	105	15.0	204	29.2	699
Eastern Mont.	1645	62.8	294	11.2	679	25.9	2618
Total	6938	65.6	1336	12.6	2305	21.8	10579

TABLE 9A.

Type of Trapper	No. Trappers	% of Total Trappers	Average Catch Per Trapper	No. Beaver Taken	% of Total Take
General	280	44.2	25	6938	65.6
Landowner*	118	18.6	12	1336	12.6
Permittee**	235	37.2	10	2305	21.8
Totals	633	100.0	17	10,579	100.0

* Holds beaver permit and Landowner Trapper's License.

** Holds beaver permit only.

Sources of error remain much the same as discussed in last year's report (Wildlife Restoration Quarterly Report, July - September, 1953) and will not be repeated here.

Comparison of data from Trapper Reports and fur dealer records indicate general agreement regarding distribution of take by fur districts and composition of take by species particularly for mink and muskrat. Both types of data reflect an increased take of mink and muskrats. The data in Table 2 suggest that if the situation concerning beaver is representative for the other species, the Trapper Report tends to give a high estimate of take; 10,579, whereas tagging records showed 9,936 beaver. Such an error of approximately six per cent is probably not excessive for management purposes.

Examination of the three year's data (Table 4) accumulated since the inception of the Fur Resources Surveys and Investigations project shows that although average prices and annual sales of trappers licenses have steadily declined, the 1952-53 take was very nearly as large as the 1950-51 take. In addition the average income per trapper was higher in the 1952-53 season than in the preceding one. Weather records indicate that favorable weather conditions may have been responsible for increased trapper success in the 1952-53 season. These data suggest that through proper manipulation of seasons, a sustained take of furs may be maintained by fewer trappers even in the face of poor market conditions and a relative abundance of more gainful employment.

MINK AND MUSKRAT SEASONS

Reference to Table 5 indicates that our present mink season - November 10 to December 31 -- is properly timed to enable trappers to receive top prices for prime furs at a time when trapping operations are practical. The proper setting of muskrat seasons is dependent upon a more complex set of factors and has been the subject of considerable controversy as to the desirability of a fall or spring season. Some of the advantages of each season are enumerated below.

Fall:

- Water levels more stable.
- Better for areas at higher elevations which stay frozen late in spring.
- Easier to trap in irrigation systems. Less damage to structures if removed before winter.
- Less pelt damage from fighting among muskrats.
- Mink and muskrat seasons could be run concurrently to avoid present illegal take of both in off seasons.
- More muskrats before winter loss occurs.
- Muskrats in areas where freezing out and water draw-down caused almost complete loss could be salvaged.
- Winter loss from lack of food, migration, disease, and predation might be reduced by more secure position of less dense populations.

Spring:

Fewer small animals taken and pelts are prime. Highest prices for muskrat pelts were paid in March, April and May.
Hunters are not present in trapping areas.
Weather conditions may be more favorable in some areas.

Assuming that the same number of muskrats and mink would be taken in the hypothetical combined fall season as were taken in the 1952-53 split season, the financial returns would be as follows:

Seasons combined:

7,274 mink @ \$15.27 each	\$111,074.00
59,106 muskrats @ \$.78 each	46,103.00
	<u>\$157,177.00</u>

Seasons separate: Fall mink season, spring muskrat season.

Fall - 6,380 mink @ \$15.27 each	\$ 97,423.00
14,740 muskrats @ \$.78 each	11,497.00

Spring - 894 mink @ \$5.44 each	4,863.00
44,366 muskrats @ \$.98 each	43,479.00
	<u>\$157,262.00</u>

As evidenced by average prices for muskrats from the two periods, fall muskrats are much less acceptable to the fur trade. Accordingly, the trapper would have to take considerably more fall muskrats to increase his income. This should be possible in most areas but until it can be clearly demonstrated, the low fall pelt value will cause most trappers to prefer the spring season. Weather conditions in some areas may make fall trapping difficult with the resulting catch even smaller than a spring take in the same area. Trapping in muskrat houses is at present unlawful by legislative action. A change in the law to allow this might be desirable to aid trapping operations where ice has made other trapping methods ineffective.

Recommendations: It is recommended that fur dealer record data comparable to those presented here be obtained for at least one more year to aid in evaluation of the change in muskrat season in eastern Montana and to provide average price information for all species.

It is also recommended that the Trapper Report survey be continued for each succeeding season to provide information on the size, distribution and composition of the fur take and the response of trappers to economic conditions.

From a biological viewpoint, the fall muskrat season seems to be the most desirable; however, economic factors involved must be given serious consideration. In order to provide

factual information, it is recommended than an investigation be undertaken to determine whether a fall muskrat season will produce sufficiently larger quantities of pelts to increase the trapper's income.

Summary:

Furs taken during the 1952-53 season totaled approximately 80,000 pelts worth more than one-quarter million dollars. Three species--beaver, mink and muskrat produced 96 per cent of the pelts and 99 per cent of the income. Beaver and mink share the top position as fur producing species.

Eighty-one per cent of the total number of pelts were produced in the Western 49 per cent of the state's area in Fur Districts 1, 2, 3, and 4.

Data obtained from fur dealer records is compared with information from the Trapper Reports. It is recommended that average prices and a monthly analysis of take be obtained from fur dealer records while the Trapper Report survey will be continued to provide information on the size, distribution and composition of the fur take.

During the past three trapping seasons Montana trappers received more than one million dollars for nearly one-quarter million pelts of wild fur animals. Four species, beaver, mink, muskrat and marten contributed 99 per cent of this income.

Analysis of trapper sales of mink and muskrat pelts and variation in average prices received on a monthly basis indicates that November 10 to December 31 mink seasons and March 15 to April 30 muskrat seasons are properly timed to provide pelts most acceptable to the fur trade. This monthly analysis also indicates that a considerable number of mink and muskrats must be taken illegally during the off season for each species. Careful investigation will be required to provide the information essential to an objective evaluation of the merits of the fall or spring muskrat season.

Average prices for most fur animals have declined from levels of past seasons, however favorable conditions resulted in a considerably larger take of mink and muskrats. As a result the average income to the individual trapper increased from about \$170 in the 1951-52 season to \$200 in the 1952-53 season.

Nine per cent of the pelts taken were sold to out-of-state buyers. Sixteen per cent of the mink and 12 per cent of the beaver pelts were sold outside the state.

Analysis of the beaver take from Trapper Report and tagging record data shows that approximately two-thirds of the beaver take was made by trappers holding the General Trapper's License. The remainder was taken by landowner beaver permittees; 13 per cent by permittees also holding a Landowner Trapper's License and 22 per cent by landowners operating solely under the beaver permit. Significant departures from this statewide picture were seen in Fur District 5 where general trappers took 87 per cent of the total take, and in Fur District 6 where only 23 per cent were taken by general trappers.

Prepared by:

Name Fletcher E. Newby

Date July 15, 1954

Approved by:

Montana State Department of Fish and Game

By Wynn G. Freeman, Assistant Director

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-49-R-3
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Fur Resources Surveys and Investigations

Leader: Fletcher E. Newby

Job Completion Report Job No. II-A Investigations Project

Title of Job: Extensive Survey of Fur Animal Distribution, Habitat and Population Status

AERIAL BEAVER COLONY COUNT, FALL 1953

OBJECTIVES:

To provide a state-wide picture of the fur resource as a basis for the application of the findings of specific local studies.

INTRODUCTION:

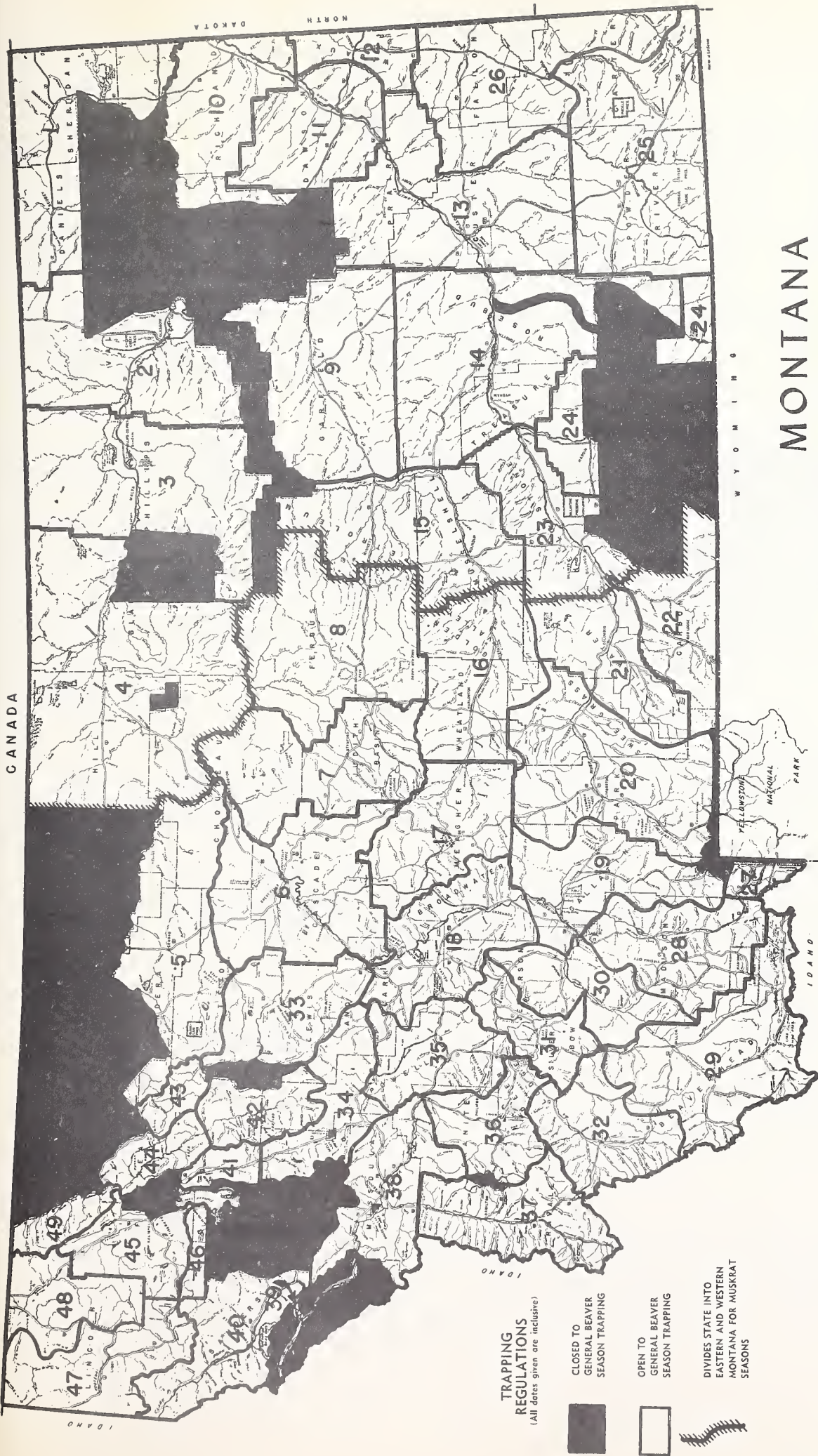
The State Legislature of 1953 gave the Fish and Game Commission the authority to open the season for beaver trapping on public lands. The Commission consequently set a 1953-54 General Beaver Season. Thus, an index of population density and distribution, designed to measure the effect of such a season, became desirable.

For management purposes, the State had been divided into 49 beaver trapping areas (1953-54 Montana Fish and Game Department Trapper Map, Figure 1). An attempt was made to obtain an aerial colony count on representative stream sections in each trapping area.

TECHNIQUES USED:

Most of the flying was accomplished by Department pilots in state-owned Piper 125 and 135 airplanes. Deputy game wardens and biologists served as observers. Planes were flown between three and eight hundred feet above the stream and at a rate of approximately seventy miles per hour. Data (including time, food cache, dam, lodge, runways and cuttings, landmarks) were recorded on standard forms (Figure 2). These forms are modifications of those used by the Canadian Wildlife Service in the Northwest Territory (Fuller 1953).

Stream sections flown were marked on county maps (scale: one-half inch = one mile) and stream map miles determined with a map measure.



MONTANA

Fish and Game Department Trapper Map,

1953-54

FIGURE 1

FIGURE 2

AERIAL BEAVER COLONY COUNT OBSERVERS DATA SHEET

OBSERVER _____

DATE _____

STREAM _____

TIME	FOOD CACHE	DAM Fr. Repair	LODGE Fr. Repair	Runways & Fr. Cuttings	LANDMARKS AND REMARKS

FINDINGS:

Total stream miles (map measure) covered were 3,499 (Figure 3); 2,672 colonies were recorded. These figures give a state-wide index of 1.3 miles per colony. Individual stream sections varied from 0.4 to 13.5 miles per colony.

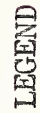
Aerial colony count data are summarized in Tables 1, 2 and 3 by beaver trapping area, major stream and fur district (Figure 4 - established in Wildlife Restoration Quarterly Report, July - September, 1952) respectively.

DISCUSSION:

The data show beaver are distributed throughout the State, and are inhabitants of every major drainage.

The highest densities are indicated in the eastern part of the State. Fur districts five, six, seven and eight, containing 51.5 percent of the total State area, show an index of approximately one colony per mile of stream (from Table 3).

The Canadian Wildlife Service considers stream beaver population densities of one mile per colony or over as indicative of saturated populations (Fuller 1953). Thus, our data show 38 percent of the stream miles and 51.5 percent of the State area surveyed is saturated; and the state-wide average (1.3 miles per colony) very close to saturation.



Flight Route

Flight Route

TABLE 1

AERIAL COLONY COUNT BY BEAVER TRAPPING AREA, FALL 1953

Area Number	Stream Miles	Colonies	Miles per Colony
1	80	53	1.5
2	117	166	0.7
3 *	120	140	0.9
4 * **	59	21	2.8
5 *	180	148	1.2
6	44	20	2.2
8 *	141	68	2.1
10	78	74	1.1
11	67	74	0.9
13 *	184	149	1.2
14 *	238	201	1.2
15	160	172	0.9
16	25	27	0.9
18	25	24	1.0
19 *	147	93	1.4
20	140	60	2.3
21 *	117	117	1.0
22 *	122	62	2.0
23	124	108	1.1
24	90	63	1.4
25 *	100	139	0.7
26	185	175	1.1
28 *	72	21	3.4
29	74	26	2.8
30	113	52	2.2
32	115	111	1.0
33	34	16	2.1
34 ***	95	50	1.9
35 ***	49	36	1.3
36	25	12	2.1
37	68	19	3.6
39	63	29	2.2
40	76	52	1.5
Flathead Indian Res.	76	46	1.7
41	15	11	1.4
43	55	53	1.0
Flathead R. Closure	30	26	1.2
45	61	44	1.4
47	83	51	1.6
48	58	46	1.3
49	63	48	1.3

* One or more stream sections mutual to two areas included.

** Not representative since colony count on Milk River is not included.

*** Errors due to fog, ice and/or other unfavorable conditions highly possible.

TABLE 2

AERIAL BEAVER COLONY COUNT BY MAJOR STREAM, FALL 1953

Stream and Sections	Miles	Colonies	Miles per Colony
Big Hole River			
Jackson to Mouth of North Fork	29	29	1.0
Mouth of North Fork to Divide Dam	43	16	2.7
Divide Dam to Glen	<u>28</u>	<u>12</u>	<u>2.3</u>
	100	57	1.7
Big Horn River			
Big Horn Canyon to Hardin	48	24	2.0
Hardin to Yellowstone River	<u>42</u>	<u>39</u>	<u>1.1</u>
	90	63	1.4
Big Muddy			
Medicine Lake to Plentywood	42	24	1.8
Plentywood to Redstone	<u>38</u>	<u>29</u>	<u>1.3</u>
	80	53	1.5
Bitterroot River			
East Fork Bridge to Corvallis Crossing	34	10	3.4
Corvallis Crossing to Stevensville Bridge	<u>34</u>	<u>9</u>	<u>3.8</u>
	68	19	3.6
Clark Fork River			
Deer Lodge to Drummond	36	21	1.7
Missoula County Line to Superior	34	20	1.7
Superior to Ferry South of Paradise	29	9	3.2
Mouth of Flathead to Thompson Falls	43	30	1.4
Thompson Falls to Noxon	<u>30</u>	<u>19</u>	<u>1.6</u>
	172	99	1.7
Clark Fork of Yellowstone			
Wyoming Line to Mouth	67	29	2.3
Clearwater River			
Rainey Lake to Salmon Lake	29	25	1.2
Flathead River			
Mouth to Agency	30	35	0.9
Agency to Kerr Dam	46	11	4.2
Holt Bridge to Red Bridge (above lake)	<u>30</u>	<u>26</u>	<u>1.2</u>
	106	72	1.5

TABLE 2 (Continued)

Stream and Sections	Miles	Colonies	Miles per Colony
Gallatin River			
West Gallatin Mouth to Trident Bridge	11	12	0.9
Jefferson River			
Mouth of Big Hole River to South Boulder	35	16	2.2
Mouth of North Boulder to Missouri River	<u>31</u>	<u>25</u>	<u>1.2</u>
	66	41	1.6
Judith River			
Big Springs Creek to Mouth	52	12	4.3
Kootenai River			
Gateway to Jennings	51	41	1.2
Jennings to Leonica	<u>45</u>	<u>14</u>	<u>3.2</u>
	96	55	1.7
Little Blackfoot			
Garrison to Avon	13	15	0.8
Little Missouri			
Capitol to Albion	42	57	0.7
Madison River			
Hot Springs Creek to Mouth	32	12	2.7
Marias River			
Sullivan Bridge to N.P. RR Bridge	46	49	0.9
N.P. RR Bridge to Turner Bridge	<u>42</u>	<u>43</u>	<u>1.0</u>
	88	92	1.0
Middle Fork of Flathead River			
Gooseberry Park to Granite Creek	15	26	0.6
Nyack to Bear Creek	<u>26</u>	<u>14</u>	<u>1.9</u>
	41	40	1.0
Milk River			
Dodson to Malta	30	43	0.7
Malta to Cree Crossing	41	45	0.9
Cree Crossing to Hinsdale	39	42	0.9
Hinsdale to Glasgow-Ft. Peck Road Bridge	45	83	0.5
Glasgow-Ft. Peck Road Bridge to Mouth	<u>52</u>	<u>56</u>	<u>0.9</u>
	207	269	0.8

TABLE 2 (Continued)

Streams and Sections	Miles	Colonies	Miles per Colony
Missouri River			
Jefferson River Mouth to Townsend	42	43	1.0
Mouth of Judith River to Ft. Peck Game Range	59	21	2.8
Ft. Peck Game Range to Petroleum County Line	<u>30</u>	<u>35</u>	<u>0.8</u>
	131	99	1.3
Musselshell River			
Meagher County Line to Harlowton	25	27	0.9
Roundup to Musselshell	41	44	0.9
Musselshell to Willow Creek	54	56	1.0
Willow Creek to Mouth	<u>65</u>	<u>72</u>	<u>0.9</u>
	185	199	0.9
North Fork of Big Hole River			
Mouth to Trail Creek	16	34	0.5
North Fork of Flathead River			
Canadian border to Coal Creek	35	29	1.2
Coal Creek to Mouth	<u>28</u>	<u>19</u>	<u>1.5</u>
	63	48	1.3
Powder River			
Powderville Bridge to Bay Horse Creek	61	77	0.8
Stillwater River			
From #93 Bridge North of Upper Stillwater Lake to #93 Bridge 12 Miles South of Spencer Lake	47	31	1.6
Sun River			
Lowery to South Fork	18	9	2.0
South Fork, Mouth to Smith Creek	<u>16</u>	<u>7</u>	<u>2.3</u>
	34	16	2.1
Teton River			
Ear Mountain Bridge to #91 Bridge	74	38	1.9
Tongue River			
Mouth to Brandenburg Bridge	77	53	1.4
Ashland to Birney	36	22	1.6
Birney to Decker	<u>43</u>	<u>19</u>	<u>2.3</u>
	156	94	1.6

TABLE 2 (Continued)

Streams and Sections	Miles	Colonies	Miles per Colony
West Gallatin River			
Williams Bridge to Mouth	35	17	2.1
Yellowstone River			
Gardiner to Livingston	68	27	2.5
Livingston to Billings	149	144	1.0
Billings to Custer	97	82	1.2
Custer to Forsyth	95	77	1.2
Forsyth to Miles City	64	83	0.8
Miles City to Glendive	100	75	1.3
Glendive to North Dakota State Line	<u>105</u>	<u>104</u>	<u>1.0</u>
	678	592	1.1

TABLE 3

AERIAL BEAVER COLONY COUNT BY FUR DISTRICTS, FALL 1953;
 PERCENT OF TOTAL STATE AREA AND NUMBER OF 1952-53 ACTIVE TRAPPERS
 BY FUR DISTRICT *

Fur District	Stream Miles	Colonies	Miles per Colony	% of Total State Area	No. Trappers Active 1952-53
1	817	524	1.6	16.6	349
2	214	164	1.3	7.1	94
3	925	566	1.6	16.2	315
4	244	131	1.9	8.7	163
5	612	544	1.1	11.4	68
6	469	463	1.0	10.1	29
7	305	320	1.0	9.3	34
8	464	472	1.0	20.7	155

* See Wildlife Restoration Quarterly Report October - December 1953

MONTANA.

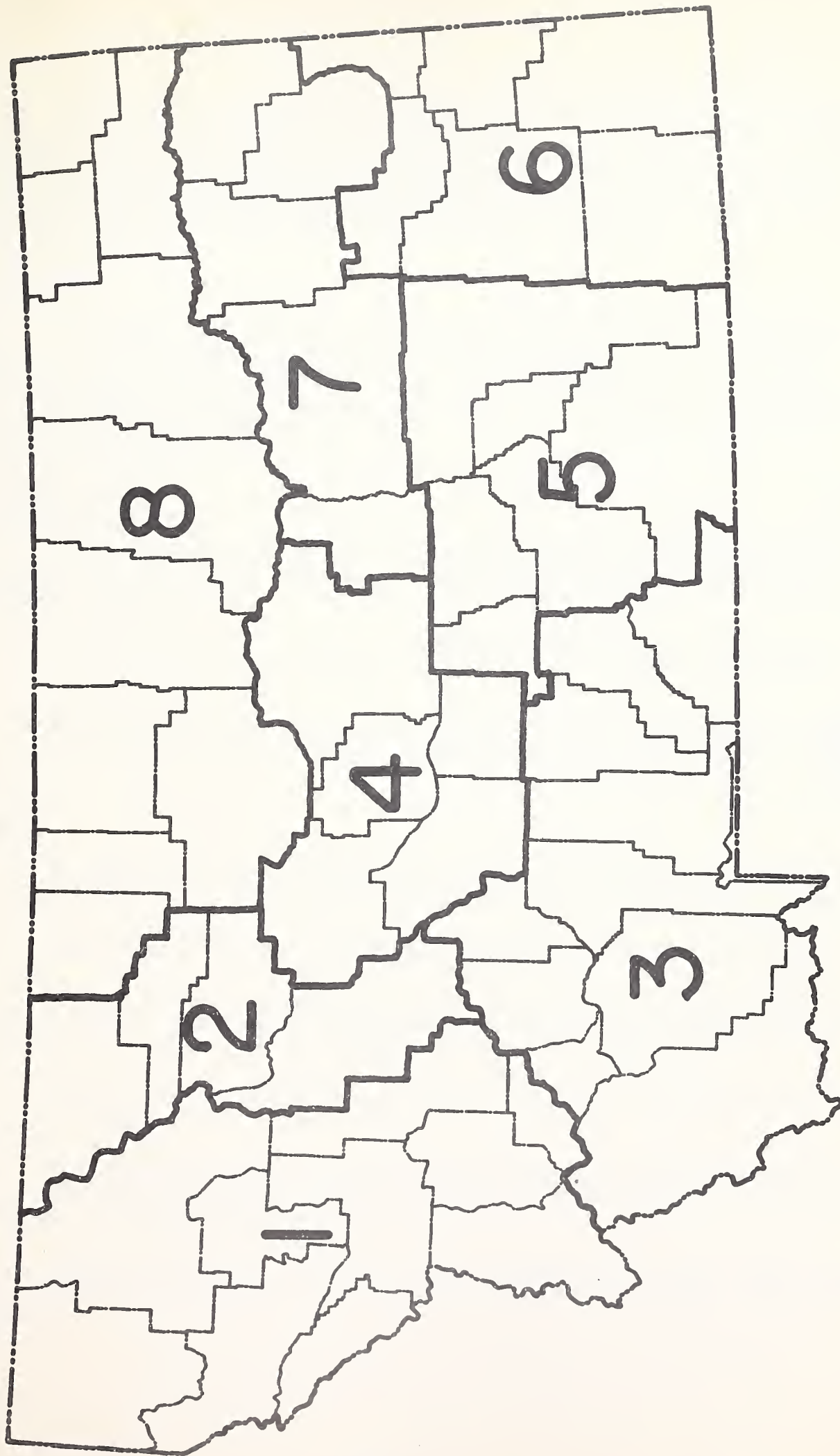


FIGURE 4:
FUR DISTRICTS

The problems of adequate harvest in these eastern areas is indicated by the relatively low number of active trappers. Fur districts five, six, seven and eight held only 23.7% of the State's active trappers in 1952-53. Further difficulty in adequately harvesting these areas is indicated by the relative low value of eastern Montana beaver pelts (Wildlife Restoration Quarterly Reports April-June, 1952 and April-June, 1953).

CONCLUSIONS:

The state-wide picture of our beaver resource shows a widespread population with the highest densities in the eastern part of the State. This density pattern combined with low prices and few trappers in the eastern half of the State clearly indicates the source of our existing problem of adequate harvest. Indications are that these areas are all saturated with beaver (Fuller 1953).

RECOMMENDATIONS:

The state-wide aerial beaver colony count should be continued to provide us with an index to population fluctuations and a check on beaver management programs.

The data should be analyzed with beaver harvest recommendations in mind.

Since the problem of adequate harvest in the eastern half of the State is the most critical, emphasis should be placed on management in this area.

SUMMARY:

A state-wide aerial beaver colony count was conducted in the fall of 1953. Total stream miles covered were 3,499; 2,672 colonies were recorded.

Beaver were found in every major drainage throughout the State.

An average of 1.3 miles per colony was indicated with variations from 0.4 to 13.5. The highest densities were found in the eastern half of the State where trapping pressure and prices are relatively low.

The data points out the problem of an adequate harvest in the eastern half of the State.

Fifty-one and a half percent of the State area and thirty-eight percent of the streams surveyed are considered to contain saturated beaver populations according to Fuller, 1953.

Recommendations are made to continue the aerial colony count, and to use the data in conjunction with harvest records to recommend management programs.

LITERATURE CITED:

Fuller, William A.

1953 Aerial surveys for beaver in the Mackenzie district, northwest territories. Eighteenth North American Wildlife Conference: 329-336.

Submitted by:

Name Joseph E. Townsend

Title Junior Biologist

Approved by:

Name Fletcher E. Newby

Title Senior Biologist

Approved by:

Montana State Department of Fish and Game

By Wynn G. Freeman, Assistant Director

Wildlife Restoration Division

Date July 15, 1954

STATE	Montana
PROJECT NO.	W-49-R-3
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Fur Resources Surveys and Investigations

Leader: K. R. Greer

Job Completion Report

Job No. II-B

Investigations Project

Title of Job: Muskrat Population Trends

Objectives: To obtain index figures, relating to fluctuations in muskrat populations, for guidance in management principles.

Introduction: The relative frequency of muskrat houses from year to year on an area, with proper consideration given to the number of bank muskrats, offers a valid and practical index for such an estimate (Dozier, 1948, 1953). Aerial photographs of "trend" areas would provide a more accurate, quicker and economical record of muskrat structures, vegetation, water levels, etc.

Techniques Used: With markers established on study ponds and sloughs, aerial pictures were taken from a Piper Cub airplane with an F-8 aircraft camera, 15" focal length F 5.6 lens. Ground counts were made of active muskrat houses on these areas.

Findings: True vertical pictures could not be obtained with this large camera from the side window of a Piper Cub. Low altitude (200-500 feet) pictures reduced the overall coverage while higher (1,500-3,500) pictures reduced images.

Discussion: The inadequacy in coverage and exposures of aerial photographs did not supply a total house count from an area and a correlation of ground and house counts could not be made. House counts were initiated for six local study areas.

Conclusions: With an airplane modified for taking vertical pictures, and an aerial camera with a shorter focal length capable of taking rapid exposures to allow for stereoscopic examinations, it seems probable this method may supply a reliable record of muskrat structures on an area.

Recommendations: Ground house counts should be continued for the local study area.

Representative muskrat areas should be established throughout the state to supply a yearly house count and index of the muskrat populations.

With proper equipment, an aerial census (talley and picture) on a limited scale may establish the reliability of this technique.

Summary:

Aerial photographs were taken of local study areas from a Piper Cub airplane with an F-8 aircraft camera, 15" focal length, F 5.6 lens, to record muskrat structures.

Vertical pictures and overlapping exposures to permit stereoscopic study was not accomplished with this equipment.

House counts have been initiated for six local study areas.

Aerial photographs did not supply data for comparisons with ground house counts.

Recommendations are made to carry out house counts each fall on established study areas in the state to provide an index of the muskrat populations, and to continue a limited aerial census, with adequate equipment, to determine its reliability.

Literature Cited:

Dozier, H.L. 1948. Estimating muskrat populations by house counts. Fish and Wildlife Service, Wildlife Leaflet 306, 17 pp.

Dozier, H.L. 1953. Muskrat production and management. Fish Wildlife Service, Circ. 18., 42 pp.

Prepared by:

Name K. R. Greer

Date July 15, 1954

Approved by:

Name Fletcher E. Newby

Approved by:

Montana State Department of Fish and Game

By Wynn G. Freeman, Assistant Director

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-49-R-3
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Fur Resources Surveys and Investigations

Leader: Fletcher E. Newby

Job Completion Report

Job No. II-D

Investigations Project

Title of Job: Population Status and Movements of Marten

- Objectives:
- (1) To provide basic information on movements and composition of marten populations to serve as a guide in restoring areas where marten have been nearly or completely extirpated.
 - (2) To perfect live-trapping, tagging and transporting techniques to be used in transplanting operations.
 - (3) To study the effects of large refuges or preserves on productivity of an area.

Techniques Used: Marten were live-trapped, ear-tagged, carefully examined and released.

Findings: Progress through September, 1953, was summarized and reported in a paper entitled "Progress on a Marten Live-trapping Study", presented at the 19th North American Wildlife Conference at Chicago in March, 1954.

ABSTRACT: Marten were live-trapped on a six square mile study area in Glacier National Park from August, 1952, through September, 1953. Two hundred twenty-three captures of 53 marten were obtained from 1912 trap units. Twenty-seven individuals were recaptured. The average effort required to capture one marten was nine trap units. Twenty weights of adult females averaged 635 grams while 69 weights of adult males averaged 1005 grams. A sex ratio of 135 males to 100 females (30:22) was obtained, although animals thought to be resident on the study area exhibited a 100:100 (5:5) sex ratio. Capture records showed that foraging areas must be occupied for a considerable period by some individuals. Apparent differences in range correlated with sex were indicated by minimum foraging areas of males averaging approximately four times the female average (Table 1). In addition, all males captured more than once had a mean frequency of recapture of 9.2 times whereas the comparable figure for females was 4.4.

TABLE 1
MINIMUM FORAGING AREAS

MALES			FEMALES		
Area (Sq. Mile)	No. Captures	Period (Days)	Area (Sq. Mi.)	No. Captures	Period (Days)
0.40	48	393	0.12	11	372
0.61	8	334	0.13	5	118
0.68	10	365	0.11 ¹	13	56
Mean	0.56	22	0.12	9.7	182

¹Area occupied by a juvenile female from July 14 through September 8, 1953.

Field work in the study area was continued November 25-28 and January 13 - March 16, 1954, by Vernon D. Hawley, Graduate Fellow from the Montana Cooperative Wildlife Research Unit, Missoula, with occasional assistance from the project leader. Three hundred seventy-four additional trap units were set which produced 125 captures of 37 marten. Twelve of the marten had not been captured previously.

Recommendations:

Although techniques for live-trapping and handling of marten have been well perfected, a few ear-tags have been lost through sloughing of tissue. It is recommended that increased consideration be given to the development of a more efficient tag or other method of marking. It is also suggested that a pilot study of marten transplanting be undertaken to complete development of holding and transporting techniques, and to determine the success of transplanting operations.

In order that more extensive transplanting operations planned for future execution may be efficiently conducted and properly guided, it is recommended that an intensive study be made of the distribution and population status of marten in the mountainous areas of the State with the aim of locating sources of transplant stock and cataloging suitable transplant sites.

Evaluation of marten productivity depends in part on accurate identification of age classes and since accurate field techniques have not been developed, it is recommended that more intensive effort be directed to the establishment of aging criteria based on study of known-age materials obtained from marten breeders and marked animals.

It is recommended that the present study be continued to final completion to provide basic information on sex ratios, home ranges, dispersal, population fluctuations and densities in relation to vegetation types and food supply.

Summary: Progress is reported for a marten live-trapping study conducted in Glacier National Park. Three hundred forty-eight captures of 65 marten were obtained from 2,286 trap units. Data on weights, sex ratios and home range are presented. Suggestions for future study are outlined.

Prepared by:

Name Fletcher E. Newby

Date July 15, 1954

Approved by:

Montana State Department of Fish and Game

By Wynn G. Freeman, Assistant Director

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-49-R-3
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Fur Resources Surveys and Investigations

Leader: K. R. Greer

Job Completion Report Job No. II-E Investigations Project

Title of Job: A Study of the Otter's Food Habits Along a Segment of the
Gallatin River.

Objectives: To determine, by scat analysis, the otter's food habits
in the Gallatin River.

Introduction: The Gallatin River is subjected to considerable fishing
pressure each year and several reports have accused the
otter of selectively feeding upon the largest trout in
the river.

Material was needed to supply authoritative data for
recommendations.

Techniques Used: Scat collections and analysis will be similar to that
used in the Thompson Lake study (Wildlife Restoration
Quarterly Report, April - June, 1953).

Findings: Approximately 1120 otter scats, representing every month
of the year, was collected along the Gallatin River from
September 1952 through October 1953.

Analysis of material is not completed and conclusions and
recommendations cannot be made at this time.

Summary: Analysis has not been completed on the 1120 otter scats
collected along the Gallatin River from September 1952
through October 1953.

Prepared by:

Name K. R. Greer

Date July 15, 1954

Approved by:

Name Fletcher E. Newby

Approved by:

Montana State Department of Fish and Game

By Wynn G. Freeman, Assistant Director

Wildlife Restoration Division

STATE	Montana	
PROJECT NO.	W-49-R-3	
DATE	July 15, 1954	
VOL.	V	NO. 2

Title of Project: Fur Resources Surveys and Investigations

Leader: K. R. Greer

Job Completion Report

Job No. II-F

Investigations Project

Title of Job: Mink Population Trends -- Age and Sex Ratios

Objectives: To determine an osteological aging criteria from known age mink that will be reliable for analyzing age and sex ratios from a sample of the wild mink harvest.

Introduction: Several trappers have expressed a desire to reduce or close the trapping season for mink in their areas. Their opinions are based upon less sign, reduced catches and overtrapping.

Material has been collected which should establish an age and sex ratio of the harvest and supply reliable data for recommendations.

Techniques Used: Several mink trappers were contacted (letter and in person) throughout the state for cooperating in saving mink carcasses.

Mink ranches supplied known age reference material.

A dermestid beetle colony is being used to reduce specimens to skeletal remains.

Findings: Over 1,000 mink carcasses were collected from trappers throughout the state (Fig. 1). This sample (Table 1) represents approximately 15 percent of the annual species take (Wildlife Restoration Quarterly Report, April - June, 1953; October - December, 1953).

Of the 550 ranch mink, all from one farm, approximately 100 represent the $1\frac{1}{2}$ year class and only 10 are $2\frac{1}{2}$ years or older.

Specimens are still being prepared for analysis.

Discussion: The use of the baculum for determining juvenile and adult mink has been established (Petrides, 1950; Elder, 1951). It is desirable to have a means for distinguishing female age classes and the study on the presence or absence of the supra-sesamoid tubercle of the femur (Lechleitner, 1953) proved hopeful.

-16-



Distribution of Milk Cereals Sample

However, Elder, W. H. and Sampson, F. W. (personal communication) tested this technique and their findings show the femur supra-sesamoid tubercle is not reliable as an aging criterion.

TABLE 1.

MINK TAKE* AND CARCASS SAMPLE COLLECTION BY FUR DISTRICTS

Fur District	1951	1952	1953 Carcass Sample - 1
1	1,459	1,511	313
2	600	610	128
3	1,706	1,707	286
4	894	1,358	246
5	671	557	34
6	12	129	---
7	33	152	---
8	685	824	25
TOTAL	6,060	6,848	1,032

* Mink Season - November 10 through December 31.

Recommendations: Although the material remains to be analyzed, it is apparent that more known age material ($2\frac{1}{2}$ years and older) should be collected for analysis.

Known age specimens should be collected from different ranches to test for statistical significance.

A sample of the 1954 wild mink harvest should be collected and compared with the 1953 sample.

Summary: Approximately 550 known age ranch mink will supply reference material for analyzing over 1,000 mink carcasses, for age and sex ratio, which were collected from trappers throughout the state during the 1953-54 season.

Specimen preparation is continuing and findings and conclusions cannot be made at this time.

Recommendations are made to conduct a sample collection for the 1954 mink season with comparisons of the age and sex composition to be made with the 1953 sample.

Literature Cited:

Elder, W. H. 1951. The baculum as an age criterion in Mink. Jour. Mamm. 32(1):43-50.

Lechleitner, R. R., 1953. An analysis of some age criteria in a domestic and wild population of Mink (Mustela vision) Mont. State Univ., Master Thesis. 60 pp.

Petrides, G. A. 1950. The determination of sex and age ratios in fur animals. Amer. Mid. Nat., 43(2):355-382.

Prepared by:

Name K. R. Greer

Date July 15, 1954

Approved by:

Name Fletcher E. Newby

Approved by:

Montana State Department of Fish and Game

By Wynn G. Freeman, Assistant Director

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-59-R-1
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Job Nos. I A-1, I A-2, I A-3

Title of Job: Antelope Census

1. Make necessary aerial flights in each unit.
2. Flight patterns are to follow technique developed in previous work.
3. Record size, location, cover type, proximity to water, conditions of observation and time for all antelope seen.

DATES:

April, May and June, 1954

PERSONNEL:

John B. Nicolay, Deputy Game Warden (Pilot)
Ralph Cooper, Deputy Game Warden (Pilot)
Don L. Brown, Senior Biologist (Pilot)
Robert L. Eng. Game Bird Biologist
Joe Egan, Junior Biologist
Pete Quiring, Deputy Game Warden
Fred DeRosier, Deputy Game Warden
Otto Kebschull, Deputy Game Warden
Jack Saunders, Junior Biologist

OBJECTIVES:

1. To improve census techniques.
2. Employ these techniques consecutively to obtain reliable management data.

TECHNIQUES USED:

The method used in this survey was the same as outlined in P-R Quarterly, Vol. IV, No. 2, 1953, p. 5.

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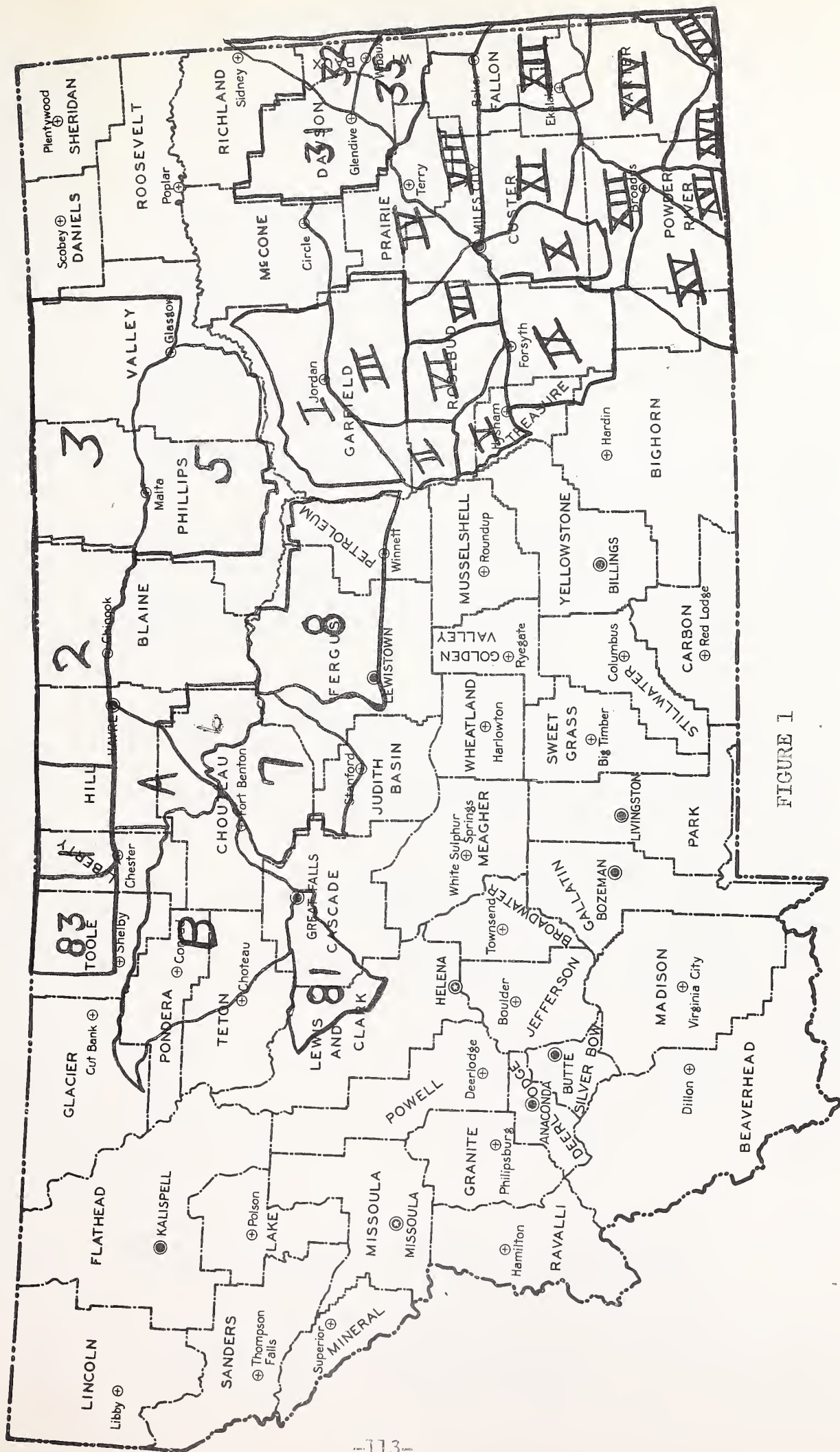


FIGURE 1

TABLE I

Area	Antelope Hunting Area	No. Antelope Observed		Strip Miles		Antelope Per Sq. Mile		Total Area		Total Antelope Computed		% Antelope Class.		Buck / Doe Ratio	
		1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
I	25	211	226	282	271	0.75	0.83	2554	2170	1915	1801	44	91	1:1.21	1:1.53
II	24	435	225	160	99	2.70	2.27	698	652	1871	1480	62	94	1.65	1.24
III	26	242	229	245	304	0.99	0.75	2163	1788	2141	1341	56	89	1.10	1.37
IV	29	288	301	323	344	0.88	0.87	2113	2075	1859	1802	62	90	0.83	1.08
V	23	152	118	111	114	1.37	1.03	703	695	963	715	59	89	0.94	0.75
VI	27	305	228	116	182	2.60	1.25	968	1053	2517	1316	48	93	0.97	2.87
VII	28	112	124	191	176	0.58	0.70	942	874	546	612	58	99	2.00	2.30
VIII	34	173	262	153	259	1.13	1.02	1045	1662	1181	1695	80	95	1.14	2.00
IX	35 ¹	77	83	110	326	0.70	0.39	2845	2123	1992	810	55	92	0.40	1.37
X	36	122	232	58	146	2.10	1.58	952	971	1999	1534	30	96	0.95	1.33
XI	37	164	315	167	283	0.98	1.11	1531	1784	1500	1980	44	97	0.90	1.08
XII	38	212	125	228	234	0.92	0.53	1513	1257	1392	666	69	92	3.61	1.30
XIII	39 ²	233	281	237	178	0.98	1.58	1102	1075	1083	1692	39	96	0.85	1.58
XIV	40 ³	394	799	271	300	1.45	2.66	2041	1879	2960	4998	49	91	0.78	1.68
XV	39 ⁴	1328	409	1491	301	0.89	1.35	1491	1491	1328	2012	65	88	1.93	2.63
XVI	76	145	280	90	99	1.61	2.82	504	504	811	1421	47	89	0.66	5.07
XVII	40 ⁵	173	161	125	110	1.38	1.46	1454	627	2007	805	43	97	0.81	2.71
XVIII	77	176	286	71	56	2.48	5.10	300	287	744	1463	38	75	0.46	1.43
8	8	347	296	365	368	0.95	1.24	3123	3123	2966	3872	55	92	1.50	1.34
Total		5,289								31,775	32,015				
31	31 ⁶	a	8	211		0.04		1287		a	51	100			7.00
32	32	a	23	151		0.29		793		a	229	96			2.14
33	33 & 74	a	64	180		0.35		1002		a	350	99			1.41
7	7		200	296		0.68		1966			1338	88			1.51

6. North of Highway 18
a. Not counted in 1953

1. Excludes area W. of Tullock Creek
2. North of Highway 8
3. North of Highway 212
4. South of Highway 8
5. South of Highway 212

TABLE II

Area	Antelope Hunting Area	No. Antelope Observed		Strip Miles		Antelope / sq. mi.		Total Area		Total Antelope Computed	
		1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
1	1	65	87	164	224	0.39	0.39	2466	1386	962	540
2	2	130	280	315	602	0.41	0.46	2610	2610	1070	1200
3	3 ¹	199	295	353	592	0.56	0.50	5328	5328	2984	2664
5	5 ²	264	315	169 [#]	525	1.56	0.60	3168	4140	4942	2484
81	81 new area		26		110		0.25		750		180
83	83* a		120		254		0.47		1080	a	507
A	None ³ new area		39		177		0.22		1080		240
B	None ⁴ new area		143		655		0.22		3816		834
Total		1305								8649	

1. Excludes area East of R42E
2. Excludes area W. of R27E & E. of R39E
3. Includes NW portion of area 6
4. Includes all of area 4
- *. Formerly included in area 1
- #. Alternate strips of 1954 census used
- a. Included in 1953 area 1 census

All areas shown in Figure I were censused using mile-wide strips at six mile intervals.

In Area 31 (Dawson County), the area south of the Glendive-Circle Road (Highway 18), and the two small areas between XII and XIV were not censused.

Some area boundaries have been changed to facilitate the census, and also to conform somewhat with the 1954 antelope hunting areas.

As in 1953, this year's census was begun before fawns were being dropped, and consequently were not tabulated during the investigation.

FINDINGS:

The Areas I through XVIII as shown in Figure I, have a total computed population of 28,143. Last year (1953) these areas had a total computed population of 28,809. From an overall standpoint, indications are the antelope population of these areas is being kept static. Further investigation of computed populations as shown in Table I show Areas I through VI were reduced, Areas VII through XII were reduced or increased, while XIII through XVIII increased (except XVII). An explanation for the increase or reduction of the areas probably lies in the nearness or accessibility of some areas to centers of hunter population. For example, Areas I through VII are proximal to good highways which lead to such towns as Glendive, Miles City, Billings, Lewistown, Great Falls, etc. Whereas Areas XIV through XVIII, although in places accessible by good roads, are extremely far from such hunter centers. From the standpoint of management it was desirable that all these areas be reduced in antelope numbers. In areas for which sufficient hunters were available, this aim was accomplished.

In addition, although conclusive evidence is not yet available, there appears to be areas in which migrations have occurred. Area XVIII, which borders Wyoming and South Dakota, shows an increase which could hardly be attributed to normal increase. The antelope herds occurring in this area range between the three states. The factors causing such migrations are probably food, weather, stock-raising activities and in the fall, hunting. This particular area, is primarily a sheep range. It was noted during the 1953 and 1954 surveys that sheep and antelope used the same portions of the area. That is, where sheep grazed one day antelope would be, and often were, found the next day. Many instances of sheep and antelope ranging within a quarter to a half mile from one another was also noted in the 1953 and 1954 surveys.

In setting up 1954 antelope hunting areas and the number of permits to be issued, the data from the 1954 aerial antelope survey were used. As in 1953, 50% was added to computed populations to compensate for the current fawn crop. In some areas it is desirable to harvest more than the annual increase whereas in others it is desirable to harvest less than the annual increase.

Table II lists two year's data for hi-line areas. Also included are several new areas which are to be kept at rather low population numbers. This is due to the agricultural interests of the area.

CONCLUSIONS AND RECOMMENDATIONS:

With only two year's data available, definite conclusions regarding any of the areas shown in figure I, are impossible at this time.

It is felt however, some areas (XIV, XV, and XVIII) are quite close to maximum numbers. In some of these areas the maximum number is above the numbers residents are willing to tolerate. Such areas should be reduced by numbers greater than the annual increase.

It is recommended that aerial surveys be continued annually until such time as sufficient data on both the method and the population is available to adequately manage these populations.

Submitted by:

Name Don L. Brown

Date June 15, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-59-R-1
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Progress Report

Investigations Projects

Work Plan I

Job Nos. I A-D

Title of Work Plan: Antelope Census, Herd Production, Migration and Mortality Studies

AERIAL ANTELOPE SURVEY YELLOWSTONE UNIT SOUTHERN
WHEATLAND SUB-UNIT

DATES: July and August, 1953

PERSONNEL:

Don L. Brown, Senior Biologist (Pilot)
R. O. Cooper, Deputy Game Warden (Pilot)
Raleigh Shields, Deputy Game Warden (Pilot)
George Chaffee, Jr. Biologist
Joe Egan, Jr. Biologist

OBJECTIVES AND PROCEDURE:

This survey is designed to produce information relative to population dynamics of antelope as well as year to year management data.

This is the sixth year of aerial work accomplished in the Wheatland sub-unit of the Yellowstone Management Unit. It was intended that this area, censused on an annual basis, would furnish yearly information which might be lacking in the overall biennial census of the entire Yellowstone Unit.

FINDINGS:

Table I lists antelope populations found within flight unit boundaries for 1953.

Table II is a summary of population data for the entire sub-unit for the six year period.

TABLE I

1953 CENSUS SUMMARY

Flight-Unit	Uncl.	Male	Female	Fawn	Total	Sq. Miles	Ant./Sq. Mile
XIII	88	48	77	55	268	87	3.08
XIV	0	0	5	1	6	22	0.27
XV	74	74	95	87	330	50	6.60
XVI	3	17	57	62	139	22	6.32
XVII	231	175	199	173	778	107	7.27
XIX	272	40	78	99	489	80	6.11
XX	7	24	60	70	161	22	7.32
XXI	272	251	280	274	1077	127	8.48
XXII	74	65	101	96	336	66	5.09
TOTAL	1021	694	952	917	3584	583	6.15

Note: Attention is called to Quarterly Report, Vol. IV, No. 1, 1953, page 17, Figure 1, to a typographical error. Column 3 Heading reads "Female" should read "Male", Column 4 Heading reads "Male", should read "Female".

TABLE I. ANTELOPE POPULATION BY FLIGHT UNITS FOR 1953.

TABLE II

SOUTHERN WHEATLAND COUNTY SUMMARY SHEET

Census Year	Total Antelope	Percent Classified	Sex and Age Composition			Computed Classification		Yearly Harvest	% Herd Harvested
			% Bucks	% Does	% Fawns	Bucks	Does		
1948	3165	None						748	23.6
1949	3820	40.0	32.3	33.5	34.2	1234	1280	600	15.7
1950	4214	40.6	42.8	28.5	28.7	1804	1201	924	21.9
1951	4499	53.2	30.2	36.3	33.5	1359	1633	1250	27.8
1952	4678	63.5	40.2	29.6	30.2	1881	1385	2106	45.0
1953	3584	71.5	27.1	37.4	35.8	971	1331	992	36.1

1948	Not classified								
1949	34.23% herd -- fawns; 65.97% herd -- adults; 52.07% annual increase								
1950	28.73% herd -- fawns; 71.27% herd -- adults; 40.33% annual increase								
1951	33.51% herd -- fawns; 66.49% herd -- adults; 50.42% annual increase								
1952	30.2% herd -- fawns; 69.8% herd -- adults; 43.2% annual increase								
1953	35.8% herd -- fawns; 64.2% herd -- adults; 55.7% annual increase								

TABLE II. FIVE-YEAR ANTELOPE POPULATION SUMMARY OF WHEATLAND SUB-UNIT

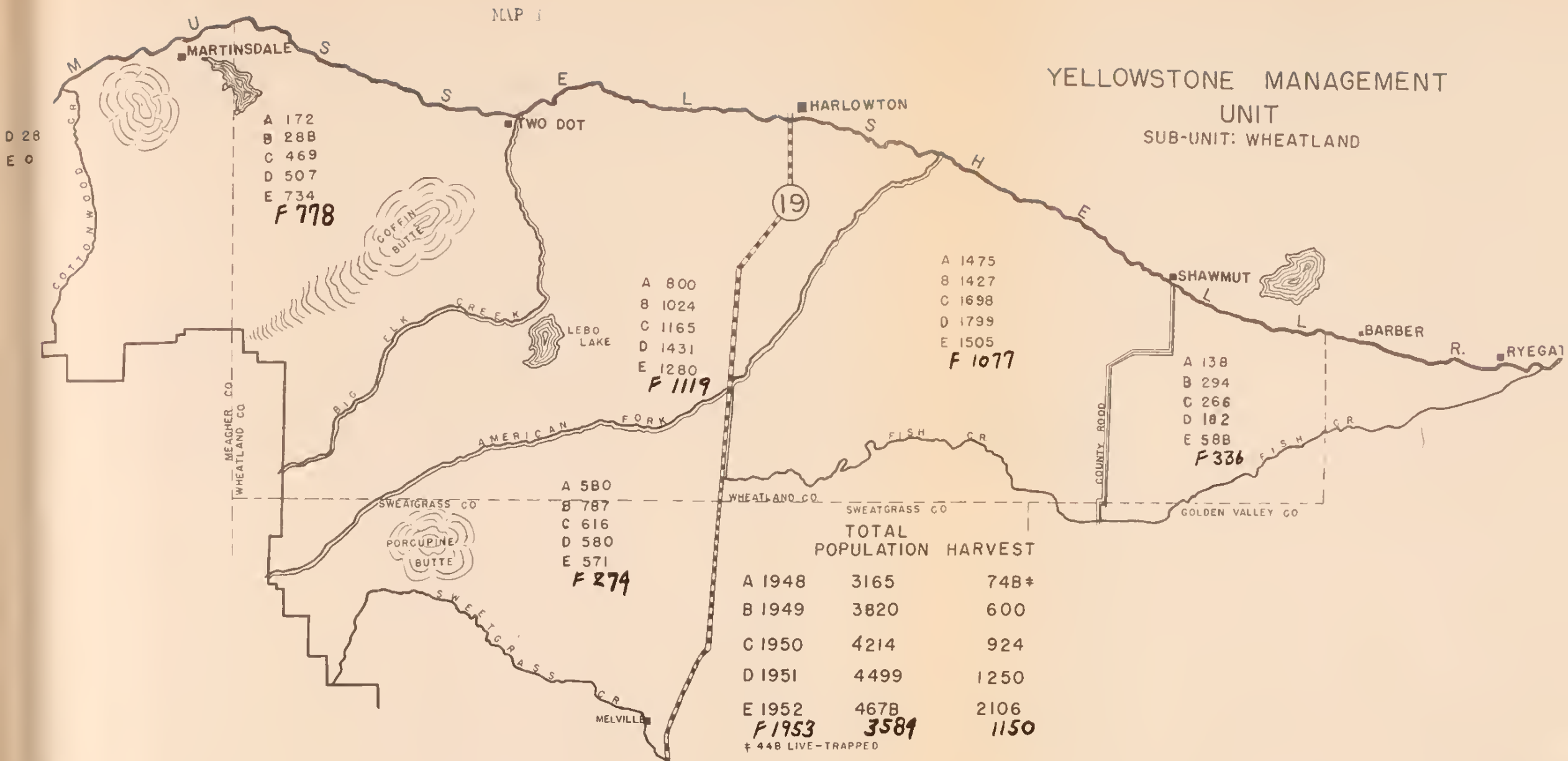


TABLE III

RESULTS OF TEN PERCENT RANDOM SAMPLE QUESTIONNAIRE

Hunting Area	No. Permits Issued	% Successful	% Males	% Females	Computed Kill
Area 15					
West of Highway 19	150 bucks	77.0	100.0	----	118
	550 either sex	92.0	32.0	68.0	503
Area 16					
East of Highway 19	250 bucks	74.0	100.0	----	179
	200 either sex	92.0	58.0	42.0	192

Figure I is a map which includes data comparing populations within topographic boundaries shown during the six years of census.

Table III is an analysis of card return data.

CONCLUSIONS AND RECOMMENDATIONS:

The existing discrepancy between Map I and Figure III is explained as follows: Insufficient evidence prior to the last two years made it impossible to compute the actual kill and evidence is still lacking on the actual crippling loss. Consequently, for the sake of comparing data, the kill (known) plus the crippling loss (unknown) was assumed to equal the number of permits issued.

This area long noted for a herd ratio running heavily to bucks is reaching a more equal sex ratio which will in turn increase the annual percent of increase. Seasons with permits for "bucks only" is the chief contributing factor.

The decreasing success ratio of buck hunters can be attributed to the fact that 1953 seasons were designed to have the "buck only" permits hunt subsequent to the either sex hunters. Naturally this added handicap was unpopular with these trophy hunters.

Submitted by:

Approved by:

Name Don L. Brown

Montana State Department of Fish and Game

Title Senior Biologist

By Faye M. Couey, Assistant Director

Name Jack Saunders

Wildlife Restoration Division

Title Junior Biologist

Date June 30, 1954

STATE	Montana
PROJECT NO.	W-59-R-1
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I

Job Nos. I A-D

Title of Work Plan: Antelope Census, Herd Production, Migration and Mortality Studies

SUMMER AERIAL ANTELOPE SURVEY (MUSSELSHELL UNIT)

DATES: July - August - September - 1953

PERSONNEL:

Don L. Brown, Senior Biologist (Pilot)
Raleigh Shields, Deputy Game Warden (Pilot)
George Chaffee, Junior Biologist (Observer)
Joe Egan, Junior Biologist (Observer)
Don Kenczka, Student Assistant (Observer)

OBJECTIVES:

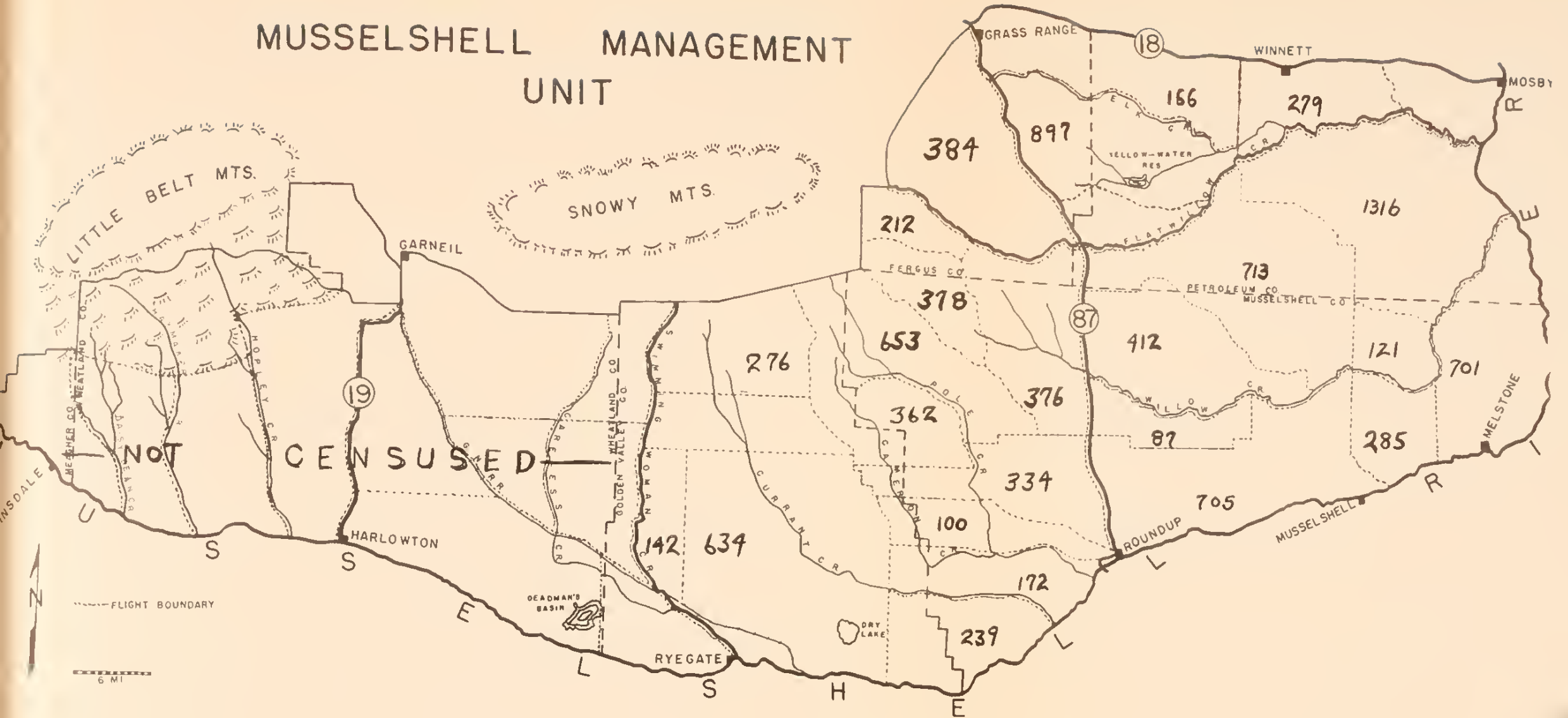
1. To furnish reliable management data.
2. Improve census techniques.
3. Determine natural loss and annual increase percentages.
4. To gather supplemental information that a movement of antelope from the Musselshell Unit to the Yellowstone Unit has occurred. (Brown, Don L. 1/)

TECHNIQUES USED:

This survey covered the same area and same procedure as the 1950 census. (Brown, L. E. 2/)

- 1/ Brown, Don L. "Aerial Antelope Survey, Musselshell Unit," P-R Quarterly, Vol. IV, No. I, 1953.
- 2/ Brown, L. E. "Aerial Antelope Survey, Musselshell Unit," P-R Quarterly, Vol. 10, No. 3, 1950.

MUSSEL SHELL MANAGEMENT UNIT



MAP II MUSSELSHELL MANAGEMENT UNIT

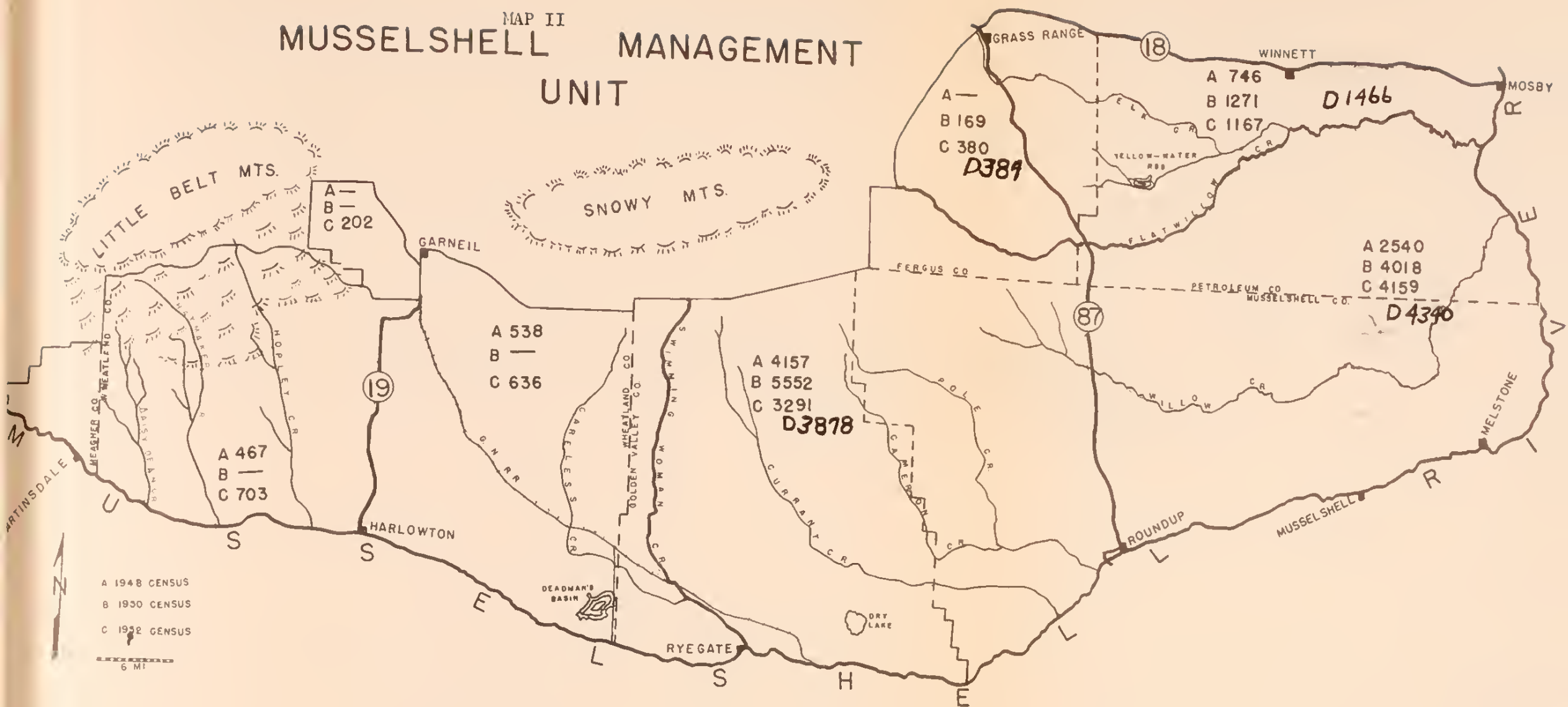


Figure I

ANTELOPE CENSUS SUMMARY SHEET (MUSSELSHELL)

	1948	1950	1952	1953
1. % Herd Class.	94. %	84. %	55. %	86.7%
2. % Class. Buck	19.57%	21.69%	25.15%	22.1%
3. % Class. Does	43.34%	40.60%	37.15%	41.5%
4. % Class. Fawns	37.09%	37.71%	37.69%	36.4%
5. Total Bucks	1457	2388	2263	2224
6. Total Does	3226	4470	3342	4179
7. Total Fawns	2760	4152	3392	3665
8. Total Unclassified			1337	
9. Grand Total	7443	11010*	8997	10068*
10. B:D Ratio	1:2.22	1:1.87	1:1.48	1:1.88
11. D:F Ratio	1:0.86	1:0.93	1:1.01	1:0.88
12. Adult-Fawn Ratio	1:0.59	1:0.61	1:0.61	1:0.57
13. % Ann. Inc.	59%	60.5%	60.5%	57.2%
14. Sq. Mi. Area	2443*	2443*	2443*	2443*
15. Ant. 1 Sq. Mi.	3.17	4.51	3.68	4.12

* Does not include Wheatland and Meagher Counties

** Includes Subunits XXI and IA

Figure II

Adults	5,835	6,817	6,504	5,807	5,462
	(4,603)*				
Annual Increase (61%)	3,559	4,158	3,967	3,542	3,332
	(2,808)				
Summer Herd	9,394	10,975	10,471	9,349	8,794
	(7,411)	(11,010)		(8,997)	(10,068)
Hunting Losses	(705)	(3,500)	(2,596)	(3,071)	
Remaining	6,706	7,475	7,875	6,278	
			- 1,200 Emigrants		
			6,675		
Average Mortality ** (13%)	871	1,019	971	868	816
Herd that Survived	5,835	6,817	6,504	5,807	5,462

* Figures enclosed with brackets, known from census, or hunting and trapping records.

** Mortality at 13% of herd after deduction of hunting and trapping losses.

FINDINGS:

Flight-unit boundaries and populations as determined for 1953 are shown on Map I.

Sub-unit populations are compared on Map II.

Table I summarizes data for the four years of census.

Table II is a continuation of the chart using an annual increase of 61% and mortality other than hunting or trapping of 13%. The aforementioned shift of antelope from the Musselshell Unit to the Yellowstone Unit is included. For explanation of shift see Yellowstone Antelope report. (Brown, Don L. 3/)

CONCLUSIONS AND RECOMMENDATIONS:

A classification technique without classifying a majority of the antelope still needs testing. As mentioned in former reports, the classification of a sufficient number of animals to be sure of results is very time consuming; on the other hand, spot checks could be misleading due to the tendency of bucks to band together in certain areas. A check on sex and age ratios made during the breeding season would make the fawn difficult to identify from the air. The method of classifying all antelope observed during the first 15 minutes of every hour will be tested on subsequent surveys and compared to several areas of complete classification.

With the percentage of annual increase remaining quite constant, total counts may be lengthened to four or five-year intervals. However, checks should be made to determine the percent of increase following several years of either sex seasons which are not accompanied by additional "bucks only" seasons. Probably the numbers of adults will remain the same with sex ratios approaching 1:1, which would lower the ratio of fawns to adults.

Area west of Careless Creek was not censused due to extremely low densities in relatively large areas.

3/ Brown, Don L., "Aerial Antelope Survey, Musselshell Unit," P-R Quarterly, Vol, IV, No. I, 1953.

Submitted by:

Name Don L. Brown

Title Senior Biologist

Name Don Kenczka

Title Student Assistant

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Date June 30, 1954

STATE	Montana
PROJECT NO.	W-59-R-1
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I

Job Nos. I A-D

Title of Work Plan: Antelope Census, Herd Production, Migration and Mortality Studies

SUMMER AERIAL ANTELOPE SURVEY (YELLOWSTONE UNIT)

DATES: July and August, 1953

PERSONNEL:

Don L. Brown, Sr. Biologist (Pilot)
R. O. Cooper, Deputy Game Warden (Pilot)
Raleigh Shields, Deputy Game Warden (Pilot)
George Chaffee, Jr. Biologist
Joe Egan, Jr. Biologist

OBJECTIVES:

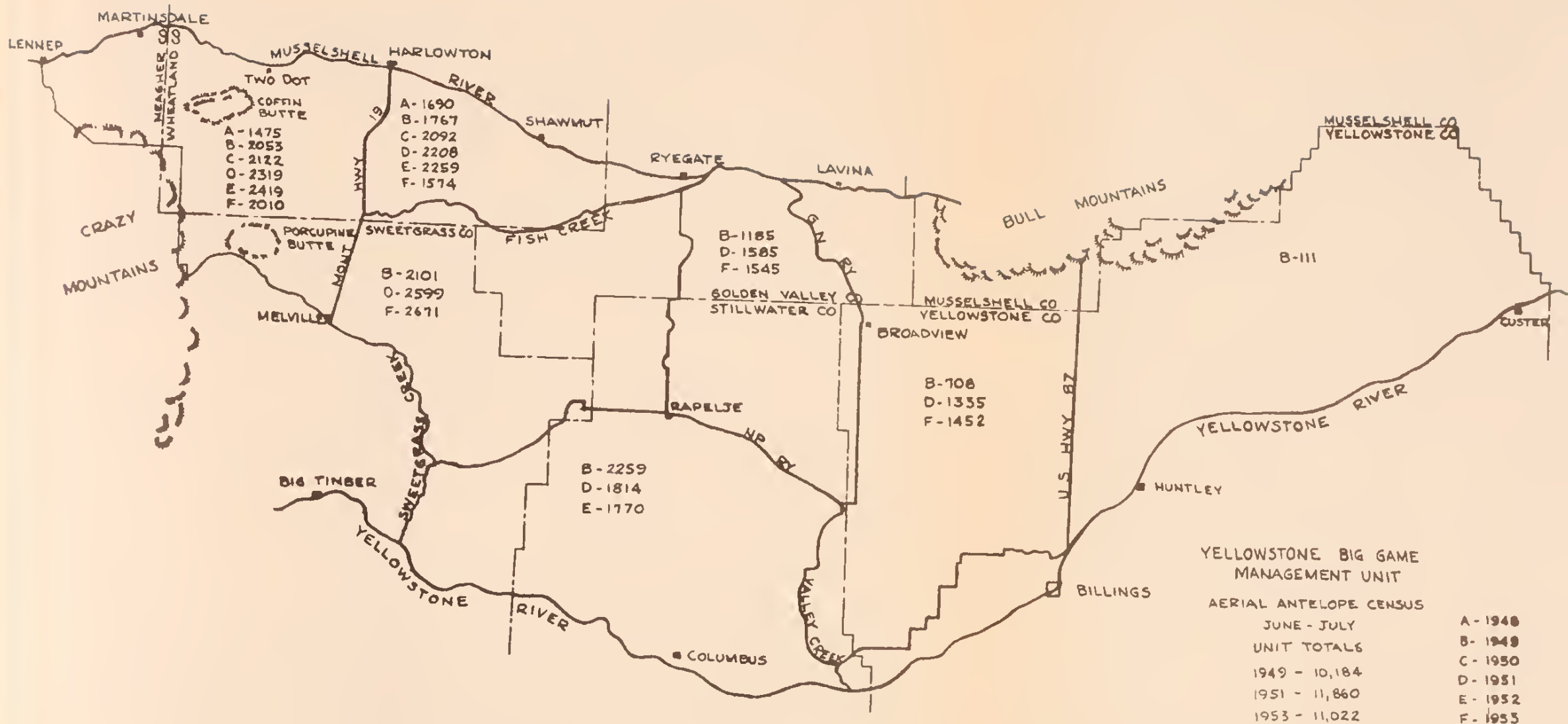
1. To furnish reliable management data.
2. Improve census techniques.
3. Determine natural loss and annual increase percentages.
4. To gather supplemental information that a movement of antelope from the Musselshell Unit to the Yellowstone Unit had occurred (Brown, Don L. 1/).

TECHNIQUES USED:

This survey covered the same area and was conducted in the same manner as the 1951 census (Johnson & Brown 2/).

- 1/ Brown, Don L. "Aerial Antelope Survey, Musselshell Unit", P-R Quarterly, Vol. IV, No. I, 1953.
- 2/ Johnson and Brown "Summer Aerial Antelope Survey Yellowstone Unit", P-R Quarterly, Vol. III, No. I, 1952.

Map I



Flight Units I, II and XVIII were omitted because of their large area and small antelope density.

FINDINGS:

Map I shows sub-unit boundaries and populations as determined for census years. Map with flight-unit boundaries and accompanying population on file in Lewistown office.

TABLE I

YELLOWSTONE BIG GAME MANAGEMENT UNIT

Aerial Antelope Census

AREA NUMBER	UNCL.	BUCK	DOES	FAWNS	TOT.	SQ. MILES
I	not censused					
II	not censused					
III	71	217	333	292	913	417
IV	241	47	133	118	539	284
V East	98	165	242	211	716	455
V West	34	206	272	277	789	
VI	178	250	409	372	1209	278
VII	21	78	128	109	336	159
VIII	8	46	94	117	265	208
IX	58	129	222	230	639	143
X	81	147	275	266	769	124
XI	49	81	248	246	624	141
XII	112	139	199	189	639	150
XIII	88	48	77	55	268	87
XIV			5	1	6	22
XV	74	74	95	87	330	50
XVI	3	17	57	62	139	22
XVII	231	175	199	173	778	107
XVIII	not censused					
XIX	272	40	78	99	489	80
XX	7	24	60	70	161	22
XXI	272	251	280	274	1077	127
XXII	74	65	101	96	336	66
Totals	1972	2199	3507	3344	11,022	2942

In order to show a correlation of figures over the five year period the flight areas will be grouped into four areas of similar terrain:

Eastern Section ----- Flight Units I, II, III, IV.
 Central Section ----- Flight Units V, VI, VII, X, XI.
 Southwestern Section - Flight Units VIII, IX, XII.
 Western Section ----- Flight Units XIII through XXII.

TABLE II

SUMMARIZED SEX & AGE CLASSIFICATION

Total Antelope			% Class.			% Bucks			% Does			% Fawns			
49	51	53	49	51	53	49	51	53	49	51	53	49	51	53	
Est.	708	1335	1452	83	45	79	24.1	16.2.	23.2	52.8	42.2	40.9	23.1	41.6	35.9
Cent.	4209	4703	4443	77	59	90	22.7	20.2	23.3	43.5	42.8	39.5	33.8	37.0	37.2
Swtn.	1336	1295	1543	44	45	88.5	13.0	21.3	23.0	49.0	37.3	37.7	38.0	41.4	39.3
West	3820	4499	3584	40	53.2	71.5	32.3	30.2	27.1	35.5	36.3	37.1	34.2	33.2	35.8

TABLE II-A

ANTELOPE / SQUARE MILE COMPARISON FOR CENSUS YEARS

	Area Sq. Mile	Antelope Sq. Mile		
		49	51	53
Est.	701	1.01	1.90	2.07
Cent.	1157	3.64	4.06	3.84
Swtn.	501	2.67	2.58	3.08
West	583	6.55	7.72	6.15

TABLE III

ANTELOPE CENSUS SUMMARY

	<u>1949</u>	<u>1951</u>	<u>1953</u>
1. % herd class	59.1	53.6	82.1
2. % Bucks	24.3	23.7	24.3
3. % Does	42.4	39.8	38.7
4. % Fawns	33.3	36.5	37.0
5. <u>Total Bucks</u>			
counted	1444	1504	2199
computed	2450	2805	2678
6. <u>Total Does</u>			
counted	2516	2522	3507
computed	4270	4707	4270
7. <u>Total Fawns</u>			
counted	1976	2316	3344
computed	3353	4320	4074
8. <u>Total Unclass.</u>	4137	5490	1972
9. <u>Total Antelope</u>	10,073	11,832	11,022
10. B:D Ratio	1: 1.74	1: 1.68	1: 1.59
11. D:F Ratio	1: 0.78	1: 0.92	1: 0.95
12. Adult:Fawn Ratio	1: 0.50	1: 0.58	1: 0.59
13. % Ann. Increase	49.9	57.5	58.6
14. Sq. Mi. of Area	2942	2942	2942

Table IV compares populations from census in 1949, 1951, and 1953, with the computed population beginning with the known populations of 1949. A constant of 13% is applied for post-hunting season losses. Hunting losses are computed from the number of permits issued. Questionnaire analyses of 1952 and 1953 indicate this figure is too great. However, for consistency during the period of study these two loss figures will be used.

TABLE IV

POPULATION DETERMINATION

	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>
Spring Herd	(6720)	7218	7314 (7512)	8501	6375 (6948)
% Increase	(49.9%)	* 53.7%	(57.5%)	** 58.0%	(58.6%)
Fawns	<u>+(3353)</u>	<u>+3876</u>	<u>+4206 (4320)</u>	<u>+4931</u>	<u>+3736 (4074)</u>
Summer Herd	(10,073)	11,094	11,520 (11,832)	13,432	10,111 (11,022)
Hunting Losses	<u>-1,776</u>	<u>-2,687</u>	<u>-2,949</u>	<u>-6,104</u>	
	8,297	8,407	8,571	7,328	
			*** <u>+1,200</u> Immigrant antelope		
			<u>9,771</u>		
Post-Hunting Season Loss 13%	<u>-1,079</u>	<u>-1,093</u>	<u>-1,270</u>	<u>- 953</u>	
Spring Herd	7,218	7,314	8,501	6,375	

Figures in parenthesis () from census.

* Average of percent of annual increase for 1949 and 1951.

** Average of percent of annual increase for 1951 and 1953.

*** Immigrant antelope from Musselshell Unit (See Text)

CONCLUSIONS AND RECOMMENDATIONS:

Attention is directed to "Conclusions and Recommendations" page 9, Quarterly Report, Volume IV, No. I, 1953, wherein the shift of antelope from the Musselshell Unit to the Yellowstone Unit during the winter of 1951-52 is discussed. Evidence supported the supposition that 1200 antelope had migrated across the Musselshell River to southern Golden Valley County. This figure was derived by subtracting the kill data from the last known census and arriving at the expected population. It was further supported by a December census and subsequent season in the recipient area.

Thirteen hundred permits were issued in the north central portion of the Yellowstone Unit after census figures indicated an abnormally heavy post-season population; 1222 antelope were harvested. Despite this extra season and additional harvest the 1953 census indicated a normal expected population.

The increase in percent of annual increase noted in Table IV from 49.9 in 1949 to 58.6 in 1953 cannot be accounted for at present. The hypothesis that a population is stimulated by hunting and harvest may be considered.

The mortality figure of 13% (Table IV) is still debatable and there is a definite need for a study covering hunter crippling and winter losses. The theoretical population differs from the known by only 8.3% after using this mortality figure over a five year period. For purposes of comparison a mortality figure of 10% was substituted which produced an error of 18% in the opposite direction. This demonstrates only that such a loss does exist and that 13% is reasonably close.

The work on success ratio of the hunters was not started until 1951, so in order to use a constant figure the hunters were assumed to be 100% successful. Subsequent information indicates the hunters were generally 85% to 90% successful which would decrease the hunter harvest figure by 10 or 15% and increase the average mortality figure by a proportionate amount.

A study on the crippling loss during the hunting season and subsequent losses from all other causes would furnish a valuable tool for future management. A comparison between losses in an area of either sex seasons and buck only seasons is also recommended.

During 1952 the spring herd increased to 8500 head, partially due to the afore-mentioned migration, and an unusual number of rancher-farmer complaints resulted. During the rest of the period the adult herd was between 6400 and 7400 head and only the usual numbers of dissatisfied ranchers complained.

The adult herd numbered 6720 antelope in the summer of 1949 as compared with 6376 in 1953, between these dates slightly over 13,000 permits have been issued with an estimated harvest of 11,200 antelope having been accomplished.

It is recommended that the study be continued until a ten-year period has been covered; at this time it is believed a definite pattern of increase and loss will have presented itself. Table IV indicates that a population may be computed for management by testing the percent of increase on a small sample yearly. Applying this increase to the computed spring population, derived from subtracting the hunter loss and mortality from other causes from the latest census figure, the number of permits to be issued can be determined. This would make it necessary to conduct an antelope census on the entire area at four or five year intervals.

Submitted by:

Name Don L. Brown

Date June 15, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-59-R-1
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Progress Report Jobs No. II-A, II-B and II-C Investigations Project

Title of Job II-A: Relationship of Antelope to Winter Wheat Production

The relationship of antelope to winter wheat has been inactive pending completion of the alfalfa study. Tentative plans are to begin preliminary work in the fall of 1954.

Title of Job II-B: Relationship of Antelope to Seed and Forage Alfalfa

DATES: July 1, 1953 to June 30, 1954

OBJECTIVE:

To obtain quantitative data on the relationship of antelope to seed and forage alfalfa.

INTRODUCTION:

A late spring in 1953 discouraged alfalfa seed production necessitating the continuation of the study in 1954. The following report concerns work completed to date and a tentative 1954 schedule. Field work on the study is still in progress. Methods employed are the same as described in a previous report (Cole, G. F. 1/). Most of the 1953 data are still in note form. Tabulation and analysis are pending completion of the field work.

Twice monthly collections of antelope for stomach samples and paunch contents have been terminated as a full year series. The analysis of stomach samples from the year series has been completed. Two additional antelope will be collected where feeding periods on alfalfa are known.

Route coverage and field checks during the 1954 season show negligible to no antelope use on the first alfalfa crop. Clip-plot comparisons of air-dried weights from exclosures

1/ Cole, G. F., Progress Report, "Relationship of Antelope to Seed and Forage Alfalfa." P-R Quarterly Vol. IV, No. 4, 1953.

and antelope utilized portions of alfalfa fields will be attempted on the second crop. Blossom and seed pod counts and measurements on tagged alfalfa plants before and after antelope use will also be attempted. Pellet group counts will be correlated with antelope utilization on alfalfa as an index to levels of depredation. A total of 42 antelope fawns have been tagged with metal ear tags and plastic ear markers. To date the numbers of relocations for tagged yearlings (1953 fawns) and fawns (1953 and 1954 fawns) are 9 and 243 respectively.

Title of Job II-C: Relationship of Antelope to Range Land

The relationship of antelope to range land study is being carried out in conjunction with the alfalfa study. Methods employed are described in a previous report (Cole, G. F. 1/). Similar work will be done in conjunction with the winter wheat study. Data on antelope food habits, with respect to the two major vegetational types inhabited by antelope in Central Montana (sagebrush-grassland and grassland), will be available upon completion of the agricultural studies. Work involving the analysis of cattle rumens and calculations of cattle-antelope equivalence will be initiated on the vegetational type where the maximum overlap of food habits is suggested.

1/ Cole, G. F., Progress Report, "Relationship of Antelope to Range Land", Vol. IV, No. 2, 1953.

Prepared by:

Name Glen F. Cole

Date July 1, 1954

Approved by:

Name Don L. Brown

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-59-R-1
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Job No. VII-A

Investigations Projects

Title of Job: Elk Trapping and Tagging on Judith Game Range

PERSONNEL: Don L. Brown, Supervisor

Bert Goodman

Bill Peary, Laborer

OBJECTIVES:

To trap elk and tag them for positive identification in future studies.

PROCEDURE AND FINDINGS:

A standard portable elk trap obtained from the Boyd Ranch was set up November 23-25, 1953, on the Judith Game Range.

The area chosen for the trap site has been observed previously to be used by wintering elk as a travel route to winter range in the bottoms. This area was about 300 yards from timber in the bottom of a grassy coulee.

The trap was equipped with an automatic trip. The trip wire was originally one foot above the ground, but in order to prevent deer from tripping it, the trip wire was raised to five feet.

The trap gate was altered to open to the outside rather than to the inside. This was done to push any entering elk into the trap rather than out.

The trap was originally baited with green, second - cutting alfalfa and one pound of oats mixed with the hay. A block of salt was kept in the trap at all times. This was very successful, but many deer were attracted to the trap. In an attempt to discourage deer, the type of hay was changed to a mixture of timothy and bluejoint obtained from the Boyd Ranch. Elk continued to use the trap but the deer use declined.

TABLE I

Elk Trapped and Tagged; Sex and Age Classification and Recapture
Information--Judith Game Range, 1953--1954

Date	Numbers	Adults		Yearlings		Calves		Recaptures
		Male	Female	Male	Female	Male	Female	
1-7-54	952 ¹		1					
	953		1					
	954		1					
	955						1	
1-9-54	957		1					
	975		1					
	965						1	
	968		1					
1-12-54	973		1					
	964				1			
	971		1					
	962		1					
1-14-54	958				1			
	960				1			
	974		1					
	972		1					
	966		1					
1-19-54	2901		1					957
	2902		1					
1-22-54	2903		1					974
	2904 ²		1					
	2905		1					
	2906		1					
	2907		1					
	2908						1	
	2909					1		
	2910					1		
	2911	1						
1-30-54	2912		1					972
	2913		1					
	2914		1					

1/ 900 series tags were antelope tags

2/ Tags with this number were used twice

TABLE 1 (Continued)

Date	Numbers	Adults		Yearlings		Calves		Recaptures
		Male	Female	Male	Female	Male	Female	
1-30-54	2915					1		
	2916				1			
	2917		1					
	2918					1		
	2919					1		
	2920		1					
2-4-54	2921		1					
	2922				1			
	2923		1					
	2924		1					
	2925					1		
	2926			1				
	2927						1	
2-13-54	2928		1					2905
	2929		1					962
	2930		1					2909
	2931		1					
	2932						1	
	2933					1		
2-16-54	2904 ³						1	
	2934			1				
	2936			1				
	2938	1						
2-21-54	2939		1					
	2940		1					
	2941		1					
	2942		1					
	2943		1					
	2944		1					
	2946		1					
3-1-54	2945		1					962 2919
3-3-54	2947		1					
3-5-54	2948		1					
	2949		1					
	2950		1					

3/ Number used twice

TABLE 1 (Continued)

Date	Numbers	Adults		Yearlings		Calves		Recaptures
		Male	Female	Male	Female	Male	Female	
3-6-54	2951		1					2916
	2952		1					
	2953			1 spike bull				
	2954		1					
3-8-54	2955		1					2934
	2956				1			2936
	2957					1		960
3-10-54	2958						1	2924
3-14-54	2959		1					
	2960		1					
	2961		1					
3-16-54	2962						1	
	2963		(1)					
	2964		(1)					
	2965		1					
3-23-54	2966		1					2905
	2967		1					
3-26-54	2968		1					2927
	2969		1					
3-29-54	2970		1					
	2971		1					
3-31-54	2973		1					972
4-3-54	2974						1	2912
	2975		1					2960
4-6-54	2972		1					2965
	2976				1			
	2977		1					
	2979		1					
	2980						1	
	2981			1				
	2982						1	
<hr/>								
Grand Totals		2	63	5	7	8	11	19

Total Animals Trapped 96

A bait line made with one bale of hay was extended outward from the gate. This bait line was thinned out in the immediate vicinity of the trap gate. A small pile was left a short distance outside the gate and several piles were left just inside the gate. One bait pile was placed under the trip wire and several piles behind the trip wire.

On December 22, 1953, the trap was baited and locked open for four days previous to the actual trapping operation. Thereafter it was operated constantly, except during periods of extremely stormy weather. The trap was in operation 99 days between December 28 and April 8, 1954. All work at the trap during this time was carried on before 2 p.m. During the remainder of the day there was no human activity near the trap.

A total of 96 elk were tagged during the period. Nineteen of these were re-trapped once, three twice, and one three times. A complete list of animals trapped is given in Table I. The largest number of elk captured in one set was nine.

Animals were tagged by running them in a squeeze pen or by roping and snubbing them to the fence.

CONCLUSIONS AND RECOMMENDATIONS:

From the standpoint of catching elk this operation was extremely successful when considering the number of man-hours involved. The number of returns on summer sight analysis and hunter return will be a measure of the final success.

It is recommended that this project be continued during the winter of 1954-55 and adding combinations of colored plastic in order to determine the summer habitat of these elk.

Submitted by:

Name Bert Goodman

Title Fieldman

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Date June 30, 1954

STATE	Montana
PROJECT NO.	W-59-R-1
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report Job No. IX-A Investigations Projects

Title of Job: Questionnaire Analysis of Special Seasons Card Returns

DATES: 1953-1954 Seasons

OBJECTIVES:

To determine the number of animals taken from an area; the average number of days spent hunting per hunter and for future reference in issuing permits.

PROCEDURE:

A canvass of hunters was necessary to obtain the desirable information. A random sample method was employed, using a ten percent sample on areas where a large number of permits were issued and a twenty percent sample on areas with a smaller number of permits. The percentages used in sampling were changed in the case of smaller areas in order to maintain an adequate sample.

Double post cards were used, one card carrying a paragraph of explanation and the permit holders address, the other a return card with the desirable information. The return card was so arranged that the hunter could fill it in with just a few check marks.

Analysis of data was made by areas and districts. Areas having similar management practices were grouped into a district.

As in last year's report (1/) an attempt was made to determine whether or not a smaller sample would have given the same results. Thus, randomly selected samples were tested by analyzing only one half of the returns.

FINDINGS:

Information from the cards is tabulated by area in Table I. An area by area comparison of the results of the 1952 season indicate that there was no significant difference in hunter success. There were 3,200 more antelope killed in 1953 along with an increase of 5,270 permits from the previous year.

The analysis of results by districts is compiled in Table I. Examination of these results show that there was no meaningful difference in either the hunter success or in the average number of days spent hunting per hunter.

These figures are remarkably constant in spite of variations in antelope populations, management practices and hunter pressure. For example, in district I there is a low antelope density as compared to district III. However, in spite of this the results are quite similar.

Table III compares hunter success ratio between either sex permit holders and "bucks only" permit holders. The error of 194 antelope between Table I and III (Total Computed Kill) is a result of "rounding off" percentages. Table III indicates either sex permit holders were found to be 22.7% more successful than "bucks only" permit holders. In most areas, either sex hunting preceded "buck only" season. In 1952 the "buck only" season preceded the either sex season and the either sex hunters were found to be only 8.8% more successful. The average number of days per hunter was essentially the same for both types of seasons.

1/ Brown, Don L., 1954, "Eastern Montana Big Game Survey, Quarterly Report", Wildlife Restoration Division, January--March 1954--44

TABLE I

Hunting Area	Yes	No	% Return	% Success	Computed Kill	% Male	% Female	Ave. No. Days Hunting	Computed Kill by Area
1	22	3	83	88	263	45	55	1.64	()
1-M	6	2	80	75	75	100	X	1.0	(338)
2	30	4	85	88	353	68	32	1.8	()
2-M	3	4	54	43	57	100	X	2.8	(410)
3	60	7	67	90	900	42	58	1.6	()
3-M	6	4	38	60	156	100	X	1.4	(1056)
5	62	18	57	76	823	64	36	1.69	()
5-M	6	6	75	50	82	100	X	1.33	(905)
6	6	2	80	75	75	60	40	2.4	()
6-M	6	2	80	75	39	100	X	1.8	(114)
7	37	0	74	100	502	62	38	1.3	()
7-M	10	3	87	77	117	100	X	1.5	(619)
8	45	10	79	82	575	72	28	1.3	()
8-M	16	11	82	59	195	100	X	1.6	(770)
9	9	1	66	90	134	86	14	1.3	()
9-M	7	1	80	88	48	100	X	1.66	(182)
10	18	8	87	69	205	53	47	.88	()
10-M	6	3	90	66	68	100	X	1.3	(273)
11	23	8	78	74	297	59	41	1.9	()
11-M	0	2	29	0	0	0	0	.5	(297)
12	21	4	71	84	293	58	42	1.3	()
12-M	6	0	55	100	56	100	X	1.33	(349)
13	37	6	84	86	426	53	47	1.4	()
13-M	8	1	60	88	127	100	X	1.6	(553)
14	54	6	80	90	672	59	41	1.5	()
14-M	5	3	66	63	74	100	X	1.4	(746)
15	36	3	70	92	503	32	68	1.2	()
15-M	10	3	86	77	118	100	X	2.0	(621)
16	12	1	65	92	179	58	42	1.3	()
16-M	14	5	73	74	192	100	X	1.7	(371)
17	57	3	86	95	661	59	41	1.4	()
17-M	14	7	64	67	219	100	X	1.8	(880)
18	27	0	77	100	353	50	50	1.1	()
18-M	7	2	90	78	80	100	X	1.6	(433)
19	56	7	79	89	710	52	48	1.3	()
19-M	14	4	69	78	200	100	X	2.9	(910)
20	14	6	80	70	174	85	15	1.7	()
20-M	6	0	60	100	104	100	X	1.3	(178)

TABLE I (Continued)

Hunting Area	Yes	No	% Return	% Success	Computed Kill	% Male	% Female	Ave. No. Days Hunting	Computed Kill by Area
21	9	1	67	90	135	11	89	1.4	(143)
21-M	2	5	70	29	8	100	X	3.7	(47)
22	5	1	60	83	40	80	20	1.1	(133)
22-M	1	4	56	20	7	100	X	2.8	(742)
23	17	5	73	77	231	44	56	1.8	(766)
23-M	5	4	90	56	151	100	X	1.9	(790)
24	56	6	77	90	727	58	42	1.2	(770)
24-M	3	2	50	60	15	100	X	1.4	(56)
25	53	13	70	80	756	53	47	1.5	(665)
25-M	2	3	50	40	10	100	X	1.8	(141)
26	52	8	67	87	786	63	37	1.5	(50)
26-M	3	2	72	60	4	100	X	1.4	(127)
27	56	8	74	88	764	59	41	1.3	(40)
27-M	2	2	67	50	6	100	X	1.0	(244)
28	6	7	72	46	82	80	20	1.1	(85)
28-M	-	-	--	--	--	--	--	--	(330)
29	46	9	72	84	636	70	30	1.2	(75)
29-M	6	1	70	86	29	100	X	2.1	(285)
30	10	1	69	91	147	60	40	1.4	(797)
30-M	2	2	57	50	7	100	X	1.3	(85)
31	6	2	80	75	38	40	60	1.3	(330)
31-M	1	0	16	100	12	100	X	4.0	(75)
32	11	4	88	73	126	60	40	2.4	(285)
32-M	1	0	100	100	1	100	X	5.	(75)
33	8	0	89	100	35	57	43	1.3	(40)
33-M	3	1	67	75	5	100	X	2.8	(244)
34	15	6	67	71	225	50	50	.9	(85)
34-M	5	0	71	100	19	100	X	1.2	(330)
35	4	3	54	57	72	50	50	.6	(75)
35-M	4	2	86	67	13	100	X	2.	(285)
36	17	5	72	77	226	38	62	1.	(330)
36-M	4	0	100	100	4	4	X	3.3	(75)
37	6	2	50	75	119	40	60	1.	(75)
37-M	0	0	0	0	0	0	0	0.	(75)
38	24	2	87-	92	279	55	45	1.4	(285)
38-M	1	7	80	12	6	100	X	2.3	(285)
39	50	15	63	77	794	53	47	1.4	(797)
39-M	3	0	100	100	3	100	X	2.7	(797)

TABLE I (Continued)

Hunting Area	Yes	No	% Return	% Success	Computed Kill	% Male	% Female	Ave. No. Days Hunting	Computed Kill by Area
40	86	7	72	92	1192	77	23	1.3	(1192)
40-M	--	-	--	--	----	--	--	---	(----)
41	7	1	89	88	31	43	57	1.8	(31)
42	6	2	80	75	38	67	33	1.1	(88)
42-M	3	7	59	30	50	100	X	1.8	(50)
43	7	0	70	100	49	60	40	1.3	(49)
44	7	1	73	88	67	86	14	1.6	(67)
45	6	2	80	75	38	83	17	2.0	(38)
47	8	0	62	100	125	14	86	1.3	(150)
47-M	5	1	60	83	25	100	X	1.8	(25)
48	21	9	86	70	245	55	45	1.0	(260)
48-M	3	6	90	30	15	100	X	1.0	(15)
49-M	9	1	10	90	23	100	X	1.3	(23)
52	4	2	60	67	13	67	33	1.2	(13)
71	8	1	82	89	67	88	12	1.1	(94)
71-M	4	3	70	57	27	100	X	1.4	(27)
72	8	8	80	100	201	50	50	1.4	(290)
72-M	5	1	55	83	89	100	X	1.7	(89)
73	5	3	80	63	33	40	60	1.1	(33)
73-M	0	3	75	0	0	0	0	0.7	(0)
74	8	1	100	89	37	63	37	1.3	(38)
74-M	1	4	100	20	1	100	X	0.6	(1)
75	3	2	50	60	17	50	50	1.0	(17)
75-M	0	1	33	0	0	0	0	10.0	(0)
76	9	0	90	10	97	67	33	1.7	(97)
77	5	1	67	83	35	60	40	0.8	(35)
78	11	0	100	100	75	73	27	0.9	(75)
79	11	1	73	92	142	50	50	1.3	(237)
79-M	6	8	64	43	95	100	X	1.6	(95)
Wolf Creek	8	1	90	89	27	100	X	1.3	(27)
Grand Total			73.2		19,145	60.6	39.4	1.4	19,145

TABLE II

District	Description	Areas Included in District	% Success	Average # day
I	Northern Montana	1, 2, 3, 5, 6, 20, 25, 30, 42, 73	78.0	1.5
II	Musselshell Unit	9, 10, 11, 12, 13, 14, 71, 79	80.6	1.4
III	Yellowstone Unit	15, 16, 17, 18, 19, 20, 72	86.0	1.5
IV	Custer	23, 24, 26, 27, 28	82.0	1.4
V	Powder River Glendive	29, 31, 32, 33, 34, 74, 75	79.0	1.5
VI	Powder River Carter	35, 36, 37, 38, 39, 40, 76, 77	83.0	1.4
VII	Southwestern Montana	41, 43, 44, 45, 47, 48, 52, 78	80.5	1.1

TABLE III

	Permits Issued	Cards Sent	% Return (cards)	% Success	Computed Kill	% Kill Male	% Kill Female	Ave No. Days per Hunter
Bucks Only	3,870	537	68.3	61.0	2,360	100%	----	1.7
Either Sex	19,823	2,068	74.5	83.7	16,591	58.2	41.8	1.4
	23,693							

DEER

Table IV lists the hunter success and computed kill for the special deer seasons by area. This table could be used as a guide for computing the number of permits to be issued in comparable areas in order to effect a desirable kill.

TABLE IV

AREA	PERMITS	CARDS SENT	% CARDS RETURNED	% SUCCESS	COMPUTED KILL		
					% MALE	% FEMALE	AREA KILL
Billings Airport	75	75	66.7	50.0	60.0	40.0	38
Snowy Mountains	87	87	62.1	46.3	48.0	52.0	40
Wheatland	250	84	69	74.0	23.3	76.7	185

ELK

Listed in Table V are the results of the card returns for the Highwood and Judith Mountain and Little Belts special elk seasons. Cards were sent out to all permit holders for the two areas.

TABLE V

HUNTING AREA	NO. PERMITS	NO. CARDS	% CARDS RETURNED	% HUNTERS SUCCESSFUL	COMPUTED KILL	
					MALE	FEMALE
Highwood Mts.	75 Bulls	75	84.0	46.0	35	--
Highwood Mts.	45 E. S.	45	69.0	67.7	12	19
Little Belts	25	25	72.0	44.4	2	9

Submitted by:

Name Don L. Brown

Title Senior Biologist

Name Don Kenczka

Title Student Assistant

Name Harold Picton

Title Student Assistant

Approved by:

Montana State Department of Fish and Game

By Fay M. Couey, Assistant Director

Wildlife Restoration Division

Date June 30, 1954

STATE	Montana
PROJECT NO.	W-60-R-1
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. I-A Investigations Project

Title of Job: Big Game Survey in South Fork, Middle Fork and North Fork of
Flathead, Whitefish, Swan, Blackfoot and Adjacent Areas

I. Big Game Survey in the South Fork of the Flathead River

PERSONNEL: R. Austin, Pilot, Morrison Flying Service
R. Cooper, Pilot, Montana Fish and Game Department
M. Rognrud, Biologist
D. Stockstad, Biologist
P. Marshall, Biologist
L. Deist, Deputy Game Warden

OBJECTIVES:

To determine current big game population, distribution, classified counts, and other information of management value.

TECHNIQUES USED:

The survey crew flew into the area on January 31, 1954 using two airplanes, a 180 Cessna and a 125 Super Cub. Headquarters were established at Big Prairie Ranger Station and census operations began. The 180 Cessna carried two observers and covered that part of the South Fork below the mouths of White River and Big Salmon River. The Cub carried one observer and covered the remainder of the South Fork drainage.

The limits of the winter range were plotted during flight by flying up each drainage until no more sign of elk were seen. During actual censusing operation, the planes would systematically "strip" a unit of the elk range until maximum count was obtained and then would move to the next unit. Stream bottoms were covered by flying a series of overlapping figure eights down the canyon or by paralleling the stream if the canyon was too narrow for flying a pattern. Flight patterns were modified frequently by the nature of the terrain but enough time was spent in each area to thoroughly cover it.

For convenience in reporting results, a map of the entire area has been marked off into "census units". These units were

delineated to a large extent by natural boundaries separating bands of elk between which it is thought there is little movement of elk. However, it was sometimes necessary to establish arbitrary boundaries. (See Maps 1, 2 and 3)

Whenever possible, bands of elk were classified as bulls, spikes, cows and calves. Ground classified counts were taken at Danaher, Basin Creek and Big Prairie.

Dead animals were noted when seen but no time was spent in searching for them.

Snow depths were measured at Danaher, Basin Creek, Big Prairie and Spotted Bear.

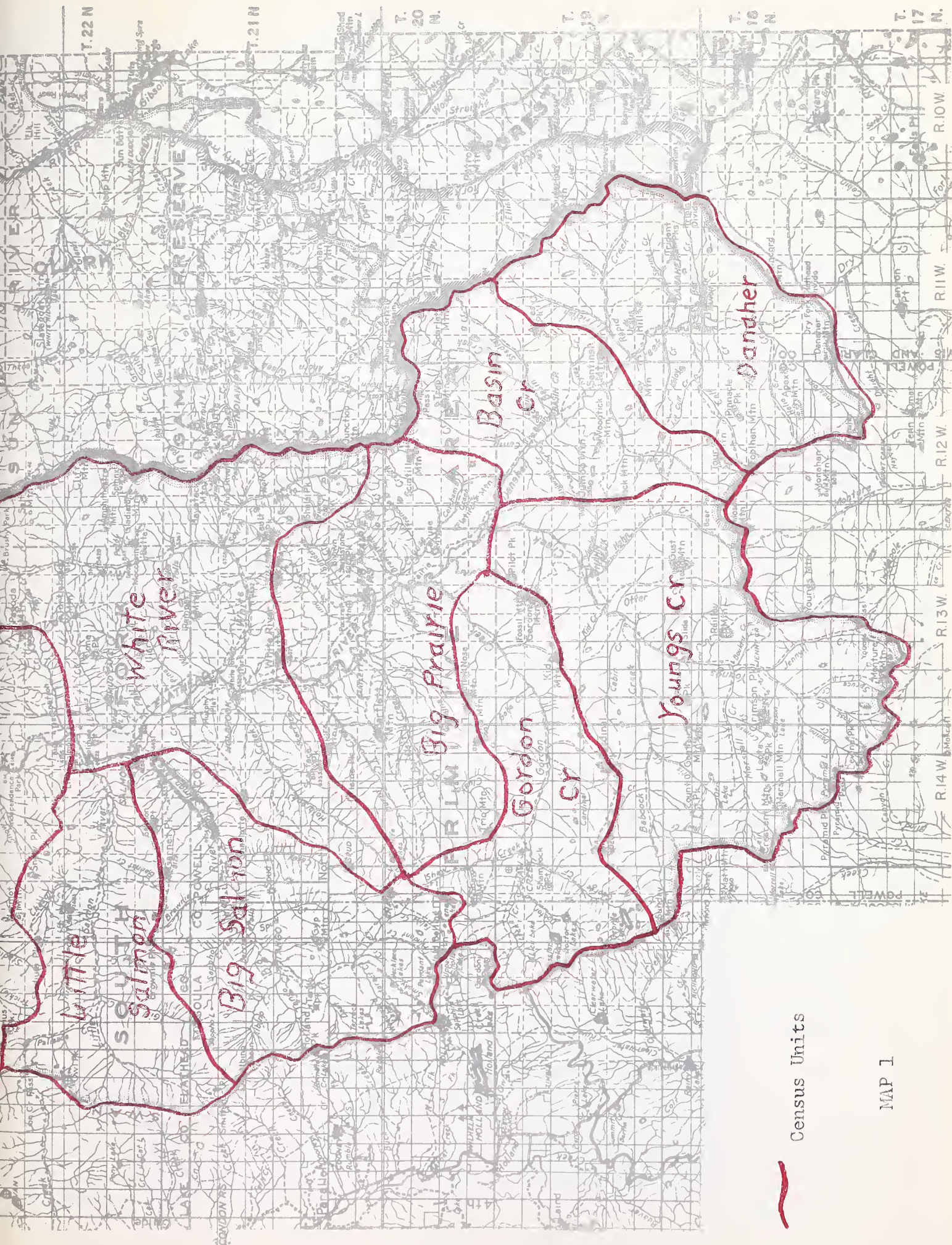
This work was repeated March 15 through 19. The procedures used in March were the same as those used on the February census.

FINDINGS:

The results of the 1954 aerial elk census are tabulated below:

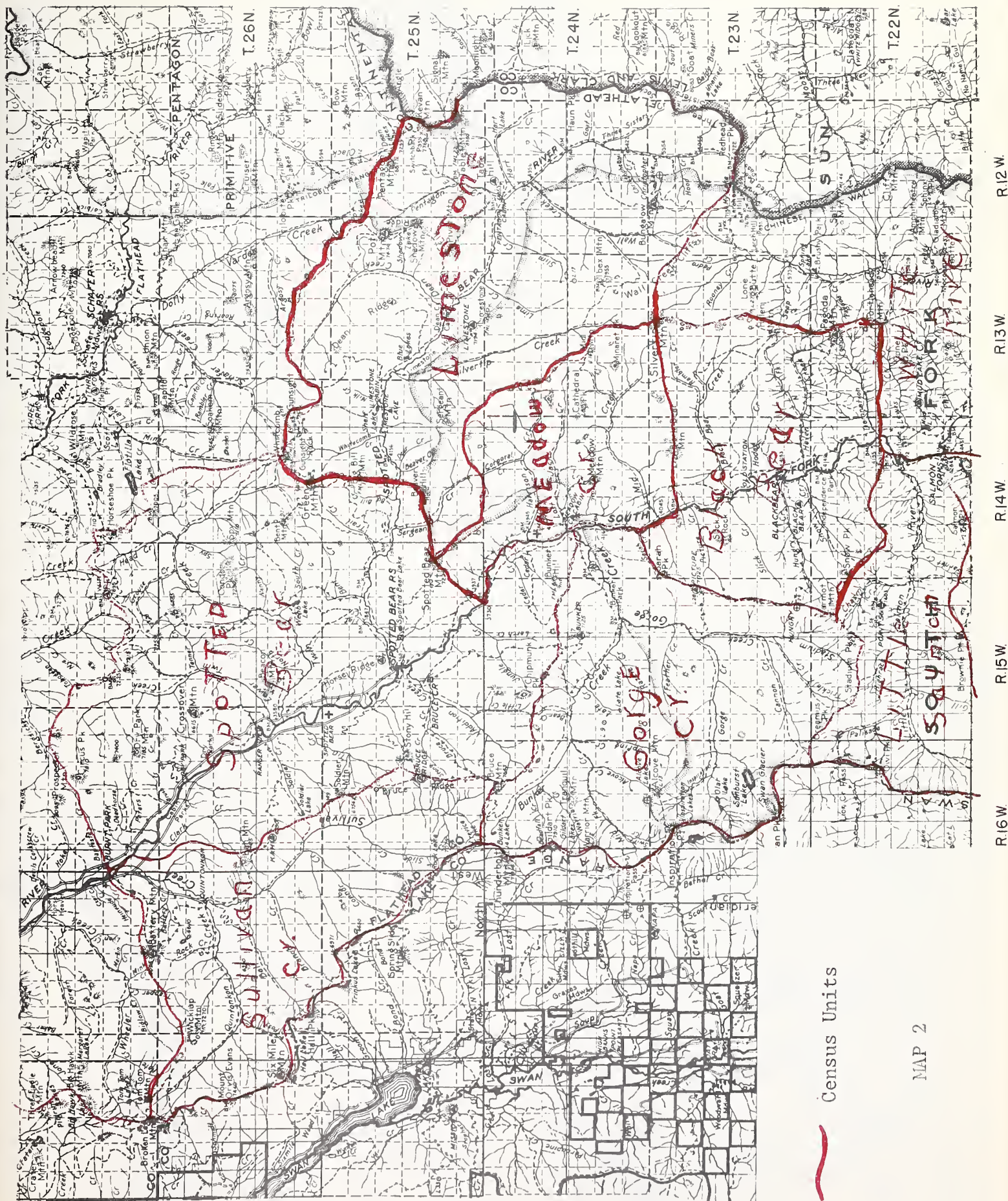
Census Unit	Feb. Count	March Count	Combined Count
Danaher	134	109	134
Basin Creek	69	91	91
Youngs Creek	81	85	85
Big Prairie	68	134	134
Gordon Creek	2	2	2
Big Salmon	42	67	67
White River	96	62	96
Little Salmon	37	15	37
Black Bear	352	222	352
Meadow Creek	49	58	58
Spotted Bear	871	595	871
Gorge Creek	100	59	100
Sullivan Creek	16	61	61
Elk Park	-	44	44
Riverside	27	98	98
Coram	-	5	5
Total	1,944	1,736	2,235

The combined count was obtained by adding together the largest counts obtained in each census unit whether made in February or March. As previously explained, little or no movement of elk occurred between the units and the combined count could be considered as valid. Differences in February and March counts for probably the result of differences in counting conditions such as visibility and elk distribution within the unit.



Census Units

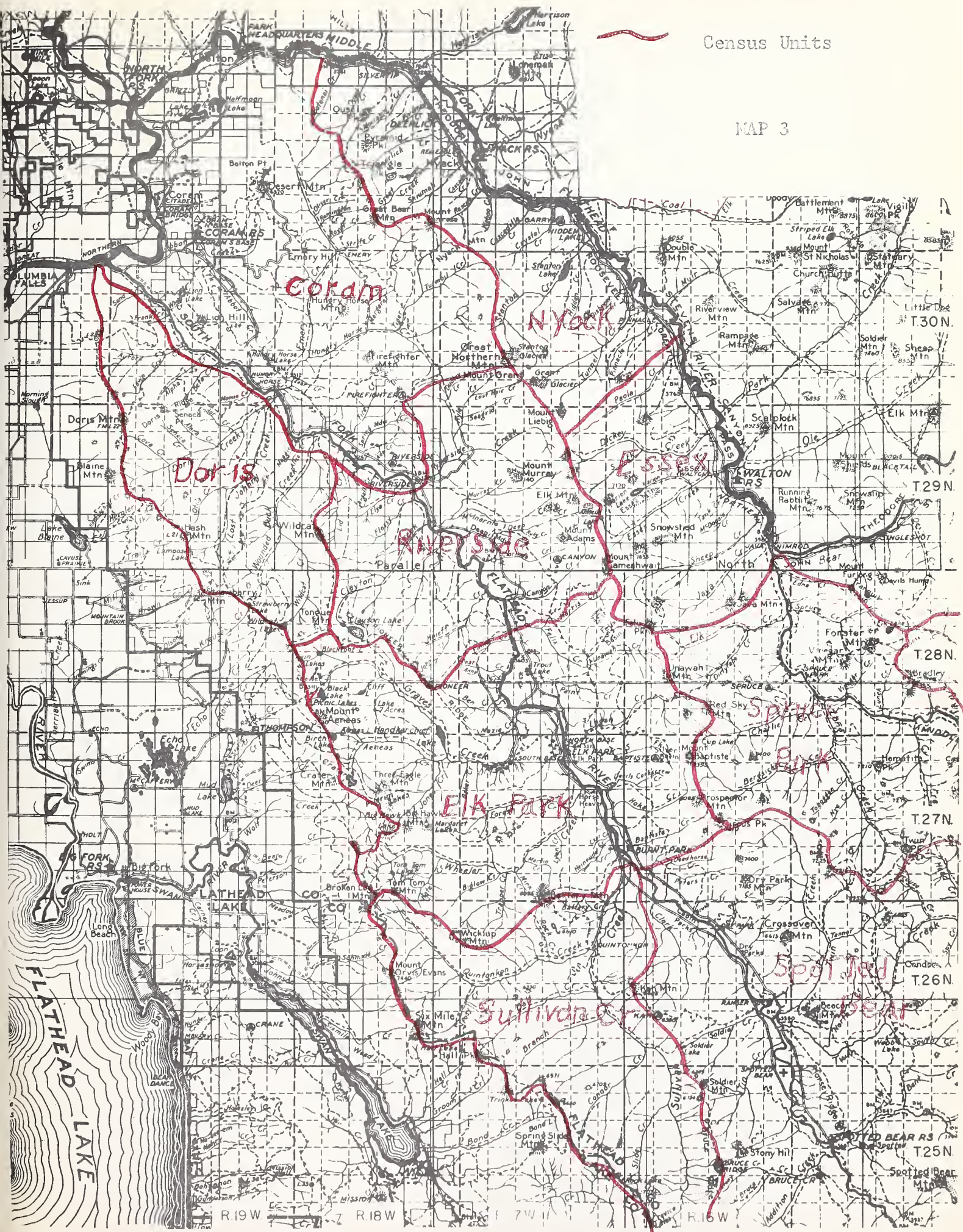
MAP 1



— Census Units

MAP 2

Lower Swan Unit



TOTAL ELK COUNTS

1949	1,755
1951	2,038
1952	2,059
1953	1,702
1954	2,235

(Highest Count in February - 1954)

Comparable data for these years indicate that the South Fork elk herd is approximately stabilized at about two thousand elk, actual count. Estimates of the counting efficiency in each of the counting units vary from 60% to 85% and from these estimates a total estimate of the population of elk in the South Fork becomes about twenty-five hundred elk.

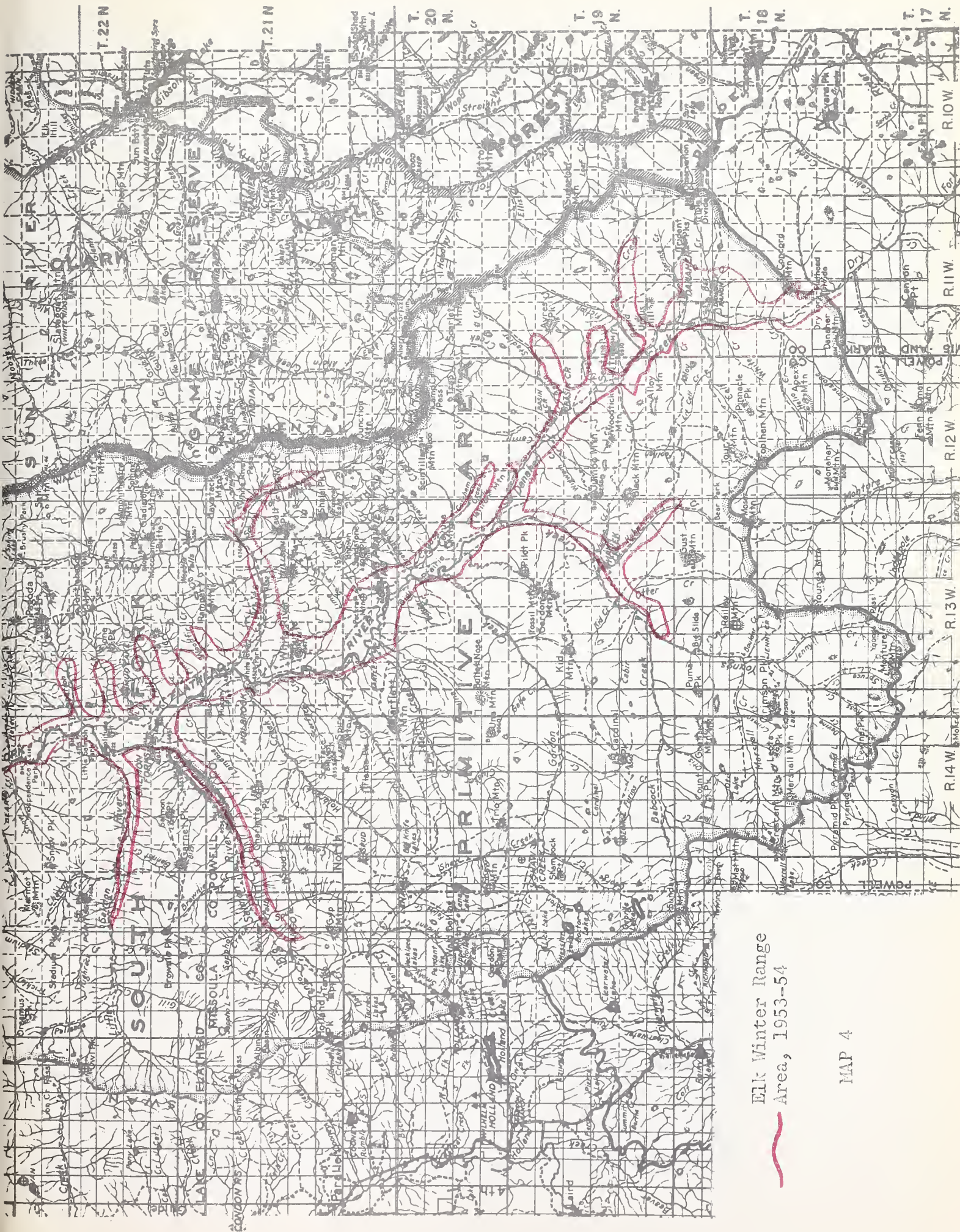
It is of interest to note that the lowest total counts have been made in late winter.

ELK DISTRIBUTION

The distribution of elk in the South Fork is shown by the maps 4, 5 and 6. For the most part, elk were confined to river and creek bottoms and to south and west facing slopes. Exceptions were noted mainly below Spotted Bear Ranger Station where elk were often found on ridge tops bared of snow by the wind. In these situations, the elevational distribution of elk was as much as 2,400 feet per horizontal mile, the base elevation in this area being 4,000 feet. It was in this area of the South Fork that the largest numbers of elk occurred during the winter.

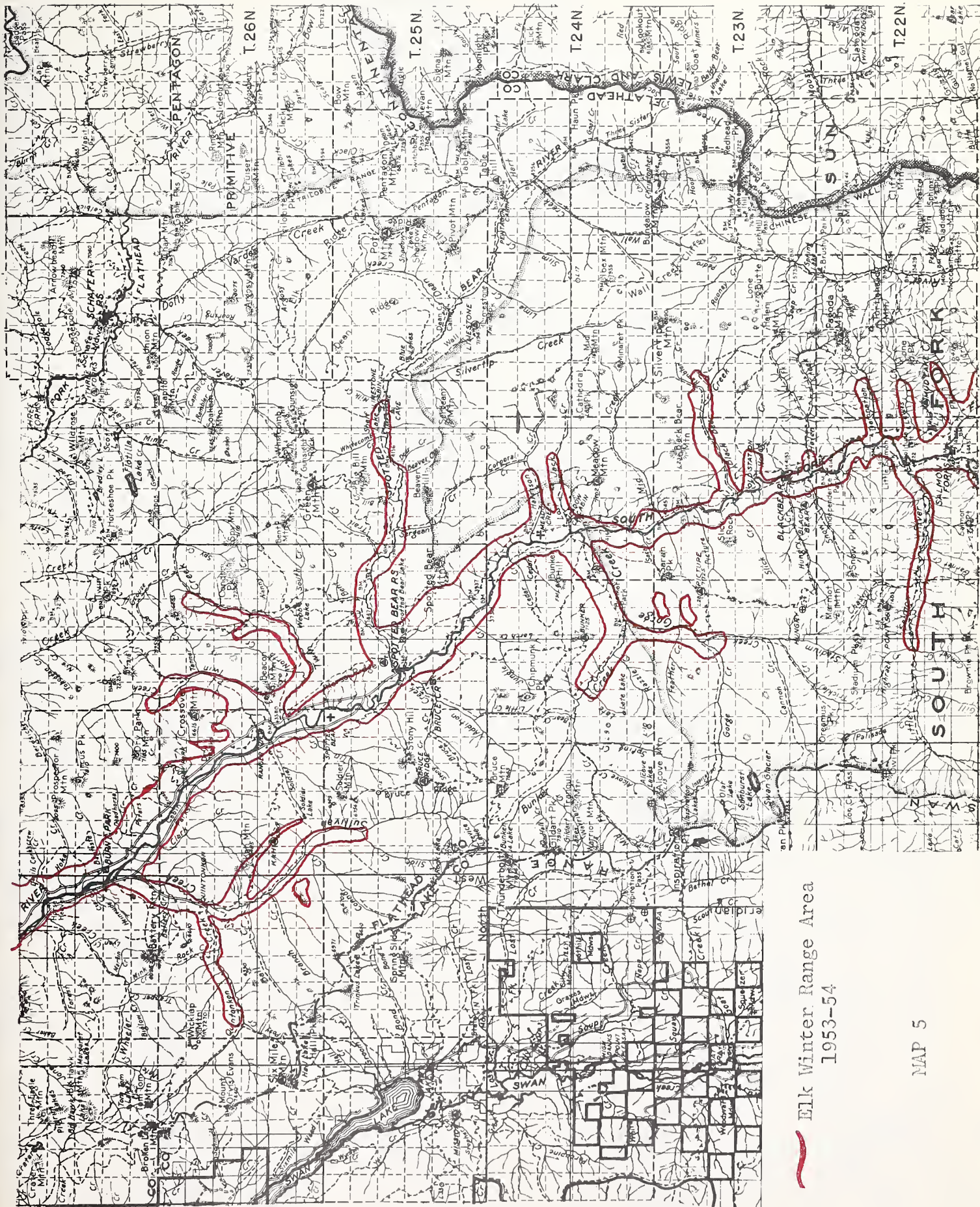
The elk winter range as plotted during flight was outlined on a map and the area was found to be 132.4 square miles by using a polar planimeter. This figure and the total actual count figure of 2,235 elk may be combined to give a population index of 16.8 elk per square mile.

Although there were no changes in the outer limits of the winter range noted between the February and March counts, there were local changes in the distribution of elk within the winter range census units. In February, many elk were seen in the rivers and creeks or on the ice but in March comparatively few elk were seen in the water. In the area below Spotted Bear, on the east side of the River, considerably fewer elk were seen in March than were seen in February. As it is in this area that possibilities for a total count are best, it is difficult to explain the reason for the lower count in March. One explanation may be that the hardness of the snow allowed greater dispersion of the elk. It was noted in March that elk were often seen walking and even running at full speed on the top of the snow.



Elk Winter Range
Area, 1953-54

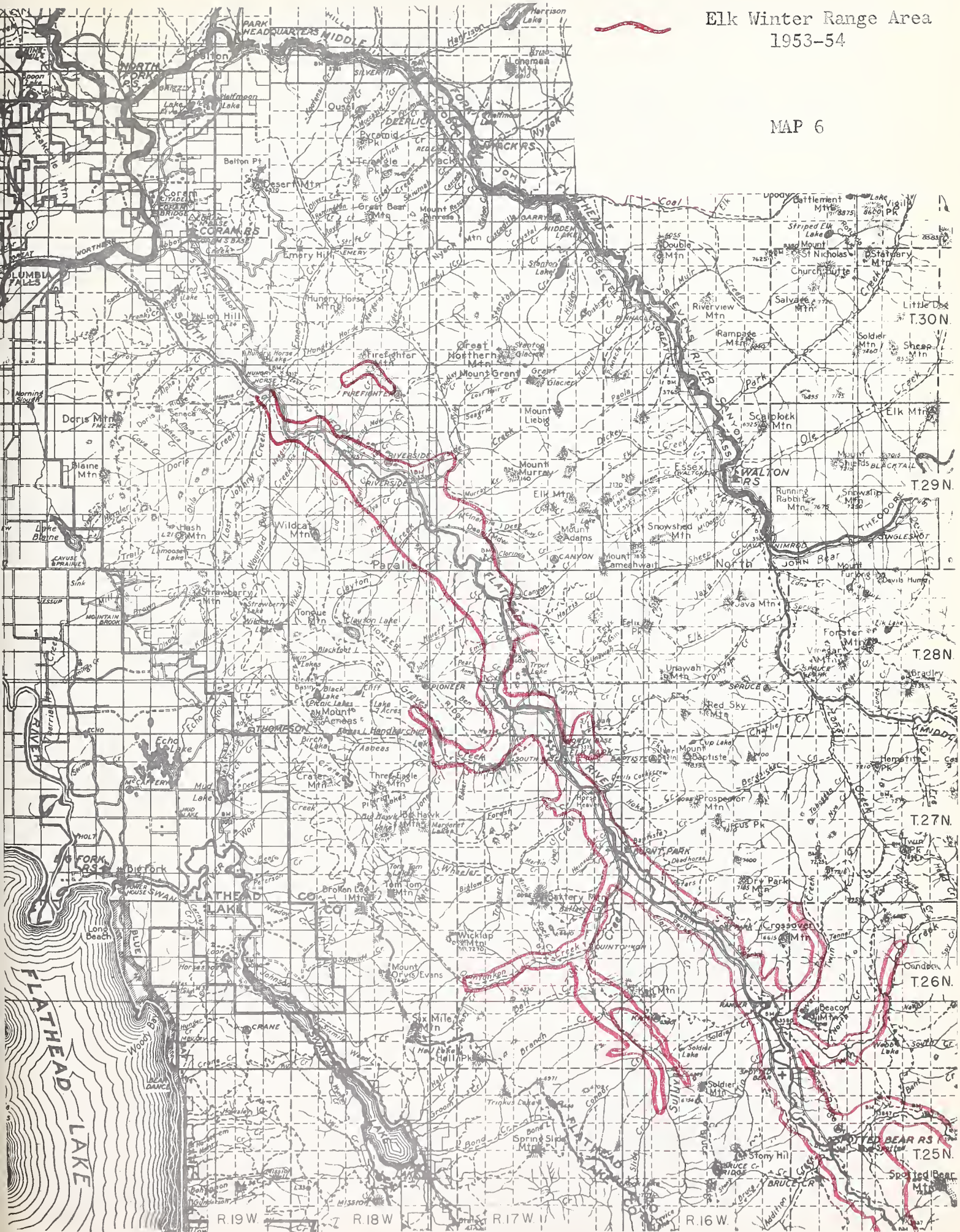
MAP 4



Lower Swan Unit

Elk Winter Range Area
1953-54

MAP 6



Data of the years 1949, 1951, 1952, 1953 and 1954 indicate a trend toward fewer elk in the upper South Fork, and an increase of elk in the lower South Fork.

Area	1949	1951	1952	1953	1954
Upper South Fork					
Big Prairie Dist.	725	767	1,041	553	609
Lower South Fork					
Spotted Bear Dist.	1,030	1,271	1,018	1,149	1,626

Such a trend may be explained, at least in part, by the comparatively poorer forage conditions in the upper South Fork. Also, movement of elk out of the upper South Fork to the Blackfoot and Sun Rivers may be increasing. The Blackfoot-Clearwater and the Sun River Game Ranges may be important factors in movements of elk from the upper South Fork.

CLASSIFIED COUNTS, 1953-54

In February, 483 elk were classified. Of these 105 were bulls (15 spikes) and 378 were cows and calves. The bull-cow and calf ratio was found to be 100 bulls to 360 cows and calves. In March, 762 elk were classified of which 197 were bulls (35 spikes) and 565 were cows and calves. The March ratio was 100 bulls to 280 cows and calves.

March classified counts include 104 elk classified from the ground at Danaher and Basin Creek and Big Prairie. These were 4 bulls, 2 spikes, 80 cows and 18 calves. These data give a sex ratio of 100 bulls to 133 cows and a cow-calf ratio of 440 cows to 100 calves. The average derived sex and age ratio was 32 bulls:100 cows:22 calves for the South Fork elk herd. A 17 percent increment to the parent winter herd was found. A limited count of 84 elk in the summer herd gave a 29 percent increment. The winter herd was comprised of 14.3 percent calves.

LOSSES

A systematic search for dead animals was not made, although they were recorded when seen. During the March survey, 15 dead elk were seen in the South Fork River and 5 others were found elsewhere in the winter range.

SNOW DEPTHS, 1954

Danaher	37 inches on March 17
Basin Creek	41 to 48 inches on March 17
Big Prairie	31 inches on March 16
Spotted Bear	35 inches on March 16

OTHER BIG GAME ANIMALS

The location and number of other big game seen incidental to the elk census are given below:

Location	Goats	Moose	Mule Deer	White-tailed Deer
Kid Mountain	2			
Youngs Creek Cliffs	3			
South Fork Babcock Creek	3			
Gyp Mountain	3			
Brownie Point	1			
Kah Mountain	1			
Hungry Mountain	2			
Sergeant Mountain	1			
Quintonkon	1			
Spotted Bear Lake	-	2		
White River	-	-	11	
Gorge Creek	-	-	1	
Horse Ridge	-	-	-	Several
Total	17	2	12	

RECOMMENDATIONS:

Although the aerial censuses as carried out in the past few years are sufficiently accurate trend counts for management purposes, it would be well to check the proportion of elk counted from the airplane in selected areas of the various types of terrain found on the winter range in the South Fork. This would probably necessitate intensive coverage of rather small areas by a ground crew of several persons. The ground crew would also be in a position to obtain classified counts of the cow-calf bands. Cow-calf ratios are of considerable value in estimating reproduction of the South Fork elk herd.

Another function of a ground crew would be to determine winter losses. Information on losses other than hunting is meager but would be very desirable. Unfortunately, the best time for securing data on sex and age ratios for instance may not be the best time for securing data on natural losses.

The movement of elk out of the upper South Fork to adjacent winter ranges should receive more attention. It is known from tagging operations that there is some movement between these areas, but the extent of such movement is not known.

Formal range condition surveys should be initiated as soon as possible. From the present scanty knowledge of the forage conditions, it would appear that a reduction of elk, particularly in the upper South Fork, would be desirable.

II. Big Game Survey in the Middle Fork of the Flathead River

DATES: February 2 and March 4, 1954

PERSONNEL: R. Austin, pilot
R. Wilson, District Supervisor
M. Watt, District Supervisor
M. Rognrud, Biologist
P. Marshall, Jr. Biologist

TECHNIQUES USED:

The same technique was used here as in the South Fork, except that a 180 Cessna airplane was used exclusively. That part of the area below Schafer was flown February 2. Adverse weather prevented work above Schafer until March 4. Census units used in the Middle Fork are indicated on Map 7.

FINDINGS:

The results of the survey are tabulated below:

<u>Census Unit</u>	<u>Number of Elk Seen</u>	
Spruce Park	13	
Granite	130	
Schafer	33	
Winter Creek	208	
Total	384	
Elk counts for previous years:	1952	392
	1953	313
	1954	384

The elk counts for the three years suggest that this herd is fairly well stabilized. The count for 1953 was low, and attributed to the mild winter conditions of 1953 when the elk were dispersed to a greater degree than in winters of more snowfall.

The relationship of this herd to the winter elk herds in Glacier National Park to the north, Sun River to the south and the South Fork to the west, is not well known. There is undoubtedly some intermingling of elk from these areas on the Middle Fork summer range but whether some Middle Fork elk move to winter range in other areas remains to be determined.

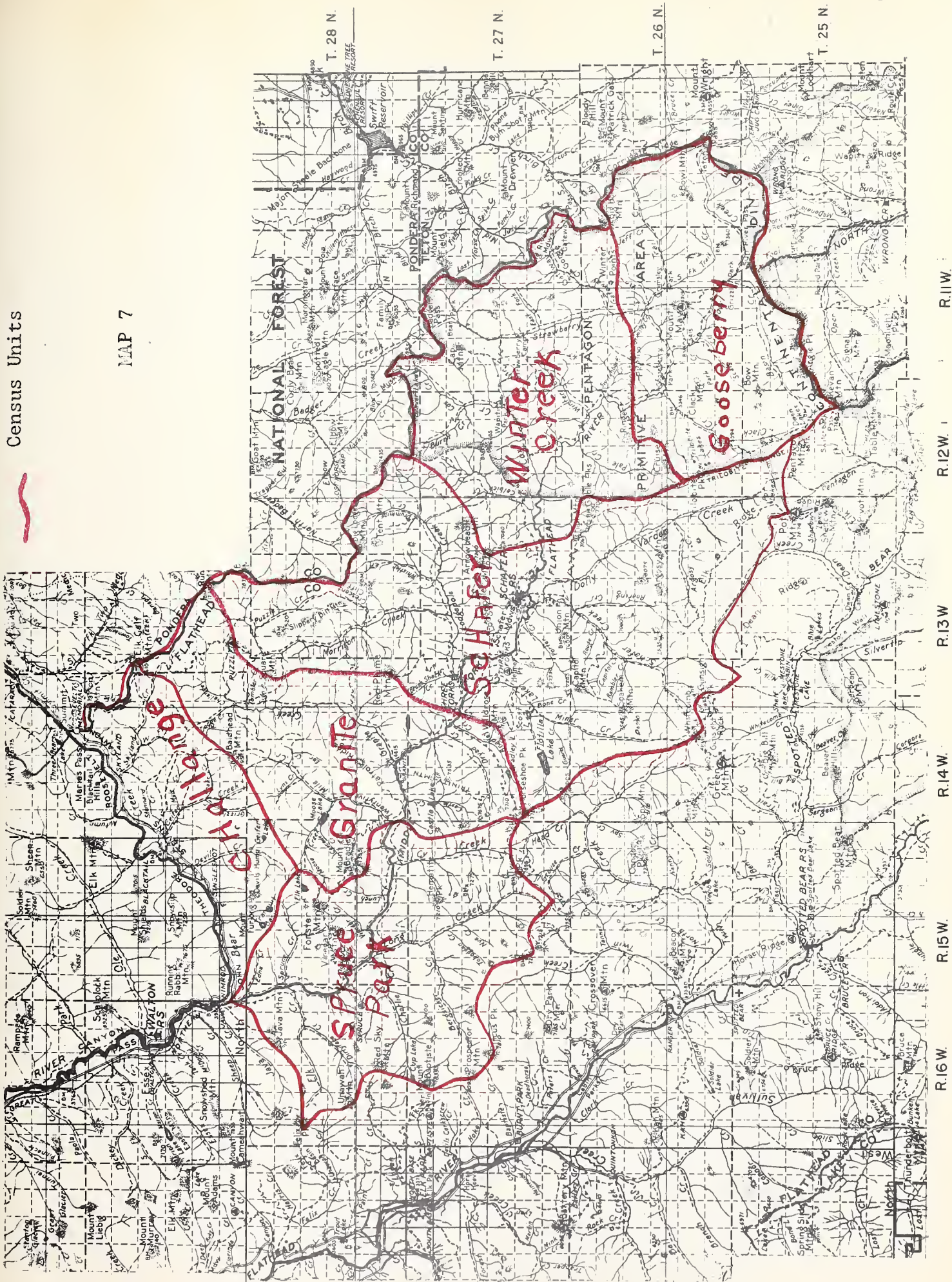
DISTRIBUTION

Map 8 shows the winter distribution of elk in the Middle Fork. That part of the range above Schafer is mostly a series of bare, wind-swept ridges varying in altitude from about 5,400 feet to 6,500 feet. Below Schafer, the elk are confined to steep south and west facing slopes along the river and the larger creeks.

Schafer Unit

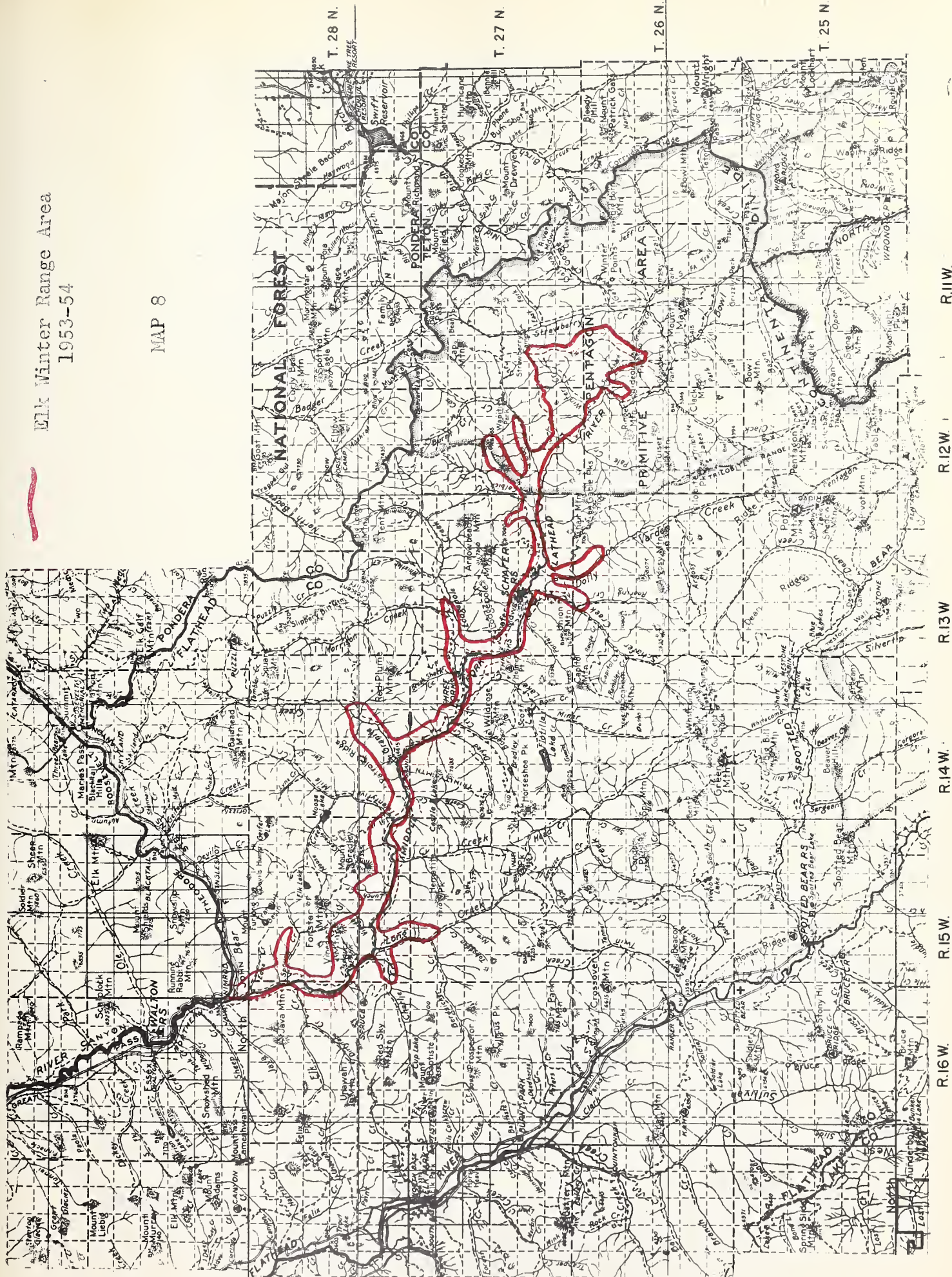
Census Units

MAP 7



Elk Winter Range Area
1953-54

MAP 8



As for the South Fork, the winter range was outlined and the area determined with a polar planimeter. It was found that there are 34.7 square miles of winter range with a density of elk of 11.1 per square mile by actual count in the Middle Fork.

CLASSIFIED COUNTS

A total of 67 elk was classified of which 12 were bulls (3 spikes) and 55 were cows and calves. The ratio of bulls to cows and calves is calculated at 100 bulls to 460 cows and calves.

This is slightly higher than the ratio obtained in the South Fork but the number of elk classified here is considerably less than was classified in the South Fork and, moreover, the Middle Fork ratio was obtained from counts in the lower part of the range only.

LOSSES

No attempt was made to locate winter losses and none were seen.

OTHER GAME SEEN

Location	Goats	Moose
Chair Mountain	12	-
Three Forks	-	1
Winter Creek	-	1
Totals	12	2

RECOMMENDATIONS:

Ground work is necessary in this area to obtain data on cow-calf ratios, losses, range condition, and snow depths.

The relationship of the elk in this area to elk in other areas should be worked out. During aerial salting operations in the spring of 1953 and 1954, several salt drops were placed between the Middle Fork and Glacier National Park in an attempt to draw elk from the Park into the Middle Fork range. The success of this operation should be investigated.

III. Big Game Survey in the North Fork of the Flathead River

DATE: March 13, 1954

PERSONNEL: L. Stockhill, Pilot
C. Merrit, Flathead Lake Wildlife Association
R. Wilson, District Warden Supervisor
P. Marshall, Junior Biologist

TECHNIQUES USED:

The same as in the South Fork.

FINDINGS:

One three-hour flight was made in this area. A total of 47 elk and 12 moose was counted. This area has relatively little suitable winter range as it is an area of rather heavy snowfall. Most of the country is fairly heavily timbered and elk are very difficult to see. The area probably could not winter an appreciably larger elk herd than it does at present. It does, however, have the capacity to support a fairly good population of moose.

IV. Big Game Survey in the Whitefish Range

DATE: March 10, 1954

PERSONNEL: R. Austin, Pilot
R. Wilson, District Warden Supervisor
P. Marshall, Junior Biologist

TECHNIQUES USED:

The same as in the South Fork.

FINDINGS:

A one-hour flight was made over the elk range of this area. Ten elk were seen on Big Mountain east of Whitefish Lake. The results of this flight were unsatisfactory and there was no opportunity for another. This area could support a small herd of elk, but more study should be given the area to determine the number of elk now on the area and the range condition.

A. White-tailed Deer Strip Census, Kalispell Area

DATES: February 8 - 12, 1954

PERSONNEL: R. Wilson, District Warden Supervisor
L. Deist, Deputy Game Warden
R. Dupler, " " "
V. Friend, " " "
L. Haverlandt, " " "
R. Lambeth, " " "
O. Nollar, " " "
E. Sager, " " "
D. Stockstad, Junior Biologist
P. Marshall, " "

TECHNIQUES USED:

A description of the area and of the preliminary field work was given in the Montana Fish and Game Department Quarterly for October-December, 1953. Following the determination of the approximate

boundaries of the winter range by field reconnaissance, an aerial reconnaissance was made on February 8 to define even more closely the limits of the winter range. The range was then plotted on a map. The acreage of the range was obtained from one inch to the mile aerial photos after final determination of the winter range boundaries during actual census operations. The deer range in this area is in two nearly separate parts, divided by the Stillwater River. Census strips were laid out one-half mile apart running due east and west.

Prior to the count, all participating personnel were assembled and the method of the census explained. Each man was supplied with a map of the area with his strip outlined on it. Directions for taking data were provided on the back of each map. (See Map 9) Compasses were used to follow the routes as closely as possible. Data was taken in such a way as to allow the results to be calculated on the basis of a strip two chains wide and on the basis of a strip with a width equal to twice the average flushing distance.

FINDINGS:

A summarization of the data is tabulated below: (Census strips indicated on Map 9.)

West Side

Number of strips	9
Number of acres observed	704
Number of deer seen on strips	69
Acres of winter range	12,160

$69 \div 704 = .098$ deer/acre (10.2 acres/deer)

$12,160 \times .098 = 1,192$ deer

KM Ranch

Number of strips	10
Number of acres observed	756
Number of deer seen on strips	61
Acres of winter range	16,000

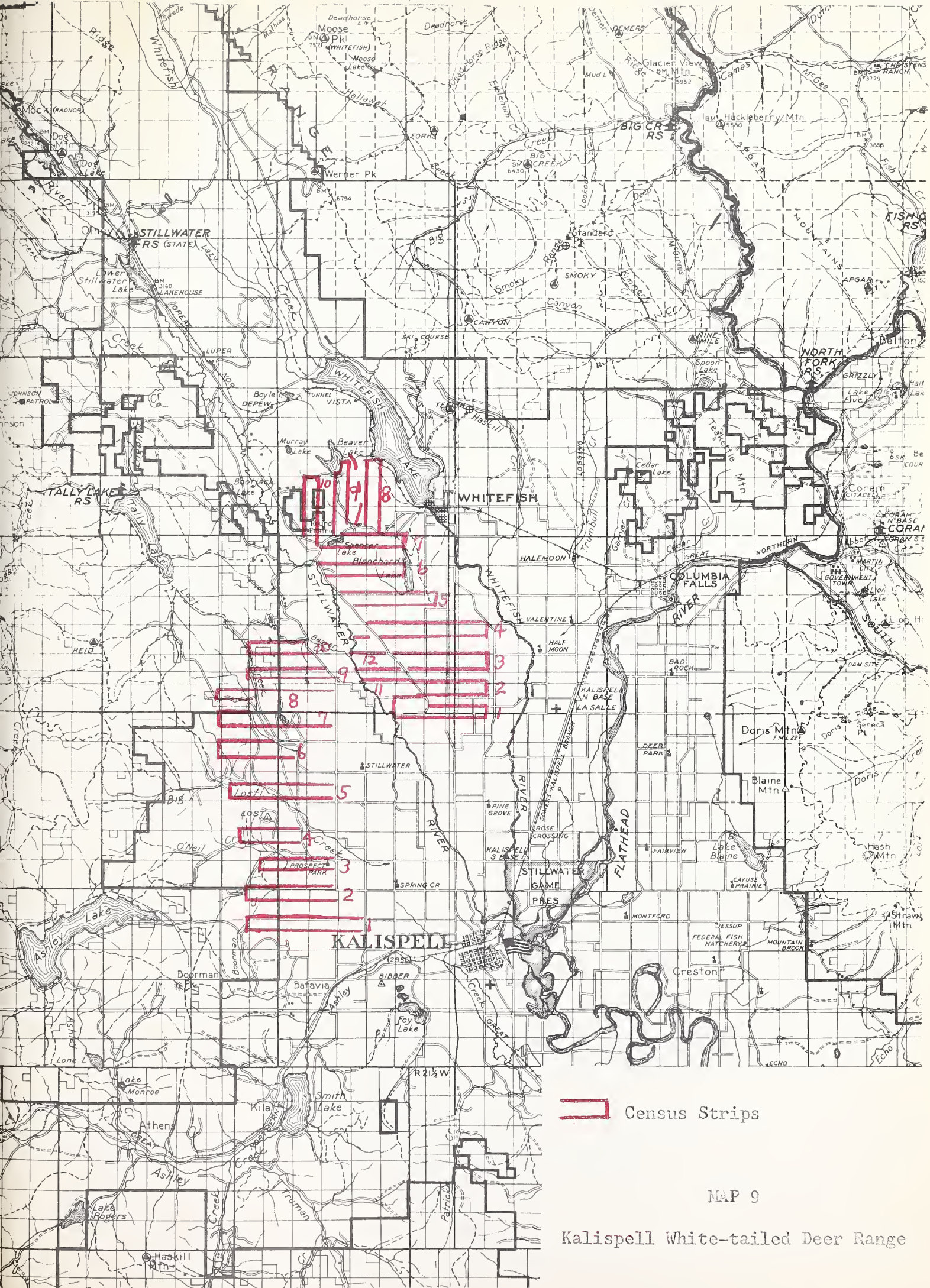
$61 \div 756 = .081$ deer/acre (12.3 acres/deer)

$16,000 \times .081 = 1,296$ deer

Estimated population $1,192 + 1,296 = 2,488$ white-tailed deer.

Total number of deer seen:

West Side	222
KM Ranch	142
	<hr/> 364



Directions for Recording Data
(Example)

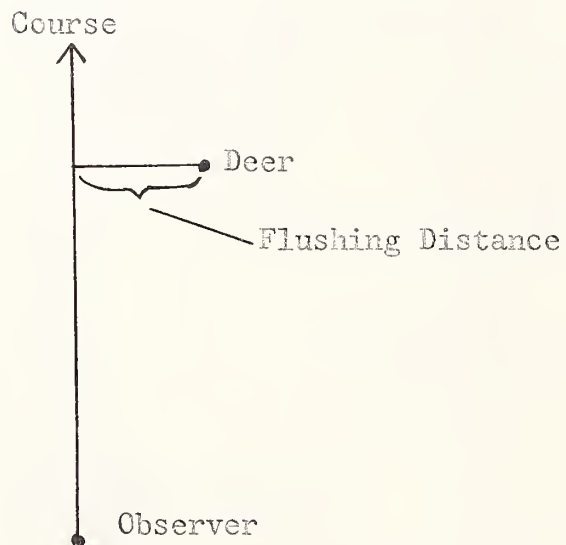
Time	No. of Deer Flushing	Flushing Distance	No. of Deer Not Flushing
9:46	1A 2F	15 Yds.	
10:05	3A 3U	30	
10:17			2A 1F
10:26	1 JT	0	

A - Adult

U - Unknown

F - Fawn

JT - Jump track (Record only if actually heard)



Classified counts:

Adults	119
Fawns	<u>57</u>
	176

100 adults:48 fawns

An examination of the data indicated that the calculations based on the two chain strip would be more reliable than those based on the average flushing distance. Consequently, only the results of the calculations of the two chain strip are presented.

The classified counts indicate a herd increment of about 48 percent. However, classified counts made in December, 1953, of 22 males, 60 females, and 28 fawns indicate a herd increment of about 34 percent. It is believed that the earlier counts are more reliable than the later counts as the fawns are more easily distinguished from the does at that time.

These data have not been subjected to statistical analysis. Statistical treatment of similar data from eastern Lincoln County (presented in the next section) suggests that sampling error may be large.

RECOMMENDATIONS:

As this was the first work to be done in this area, it is difficult to make any recommendations based on the results obtained. More work is needed to establish trends in the population from year to year and to make more data available on the reproduction of the deer herd.

B. Deer Strip Census, Eastern Lincoln County (census strips indicated on Map 10).

DATES: February 24 and 28, March 1, 1954

PERSONNEL:	R. West	Eureka Sportsman
	L. West	" "
	D. Miller	" "
	D. Morgan	" "
	R. Cloninger	U. S. Forest Service
	T. Navatril	" " "
	R. Karr	" " "
	T. Hay	" " "
	R. Findell	" " "
	R. Wilson	District Warden Supervisor
	L. Deist	Deputy Game Warden
	V. Friend	" " "
	L. Haverlandt	" " "
	R. Lambeth	" " "
	O. Nollar	" " "
	P. Marshall	Jr. Biologist

TECHNIQUES USED:

Procedures used here were almost identical with those used in the Kalispell area except that the strips were one mile apart.

FINDINGS:

A summarization of the data is tabulated below:

Number of strips	23
Number of acres observed	1,321
Number of deer seen on strips	160
Acres of winter range	45,030

$$160 \div 1,321 = .126 \text{ deer/acre (8.2 acres/deer)}$$
$$45,030 \times .126 = 5,665 \text{ deer}$$

Total number of deer seen:

White-tailed deer	445
Mule deer	<u>102</u>
	547

Classified counts (White-tailed deer)

Adults	164
Fawns	86

100 adults:52 fawns

These data were subjected to statistical analysis. The fiducial limits at the 95% level of confidence in direct population figures are 2161 and 8726 using an obtained mean of 7.7, standard deviation of 10.1, standard deviation of the mean of 2.25 and number of samples (N) were 21.

The classified counts obtained from the strip count data indicate a herd increment of about 52 percent. Counts made in December, 1953 of 36 adults and 16 fawns indicate a herd increment of about 44 percent. As in the Kalispell area, the earlier counts would probably be more reliable. However, the December sample counts in eastern Lincoln County were too small to be used as an indicator of deer reproduction.

C. Winter Losses in the Kalispell and Eastern Lincoln County Areas

During the course of browse utilization survey work in these two areas during April, note was taken of all dead deer found. On the Kalispell range the following dead deer were found in 28.5 miles of travel: 6 fawns, 2 adults, and 5 unknown age. The following were found in the Graves Creek area of Lincoln County in 19 miles of travel: 2 fawns, 7 adults, and 7 unknown age.

Calculated on a per mile basis:

Kalispell	.46 per mile
Eastern Lincoln County	.84 per mile

These figures should not be relied upon as an accurate index to winter losses in these areas as they are based on too small a sample to be representative of the range as a whole. The above data are given as a reference for future work. The eastern Lincoln County index was higher than the Kalispell index due to highway and railroad deer losses in the former area rather than due to differences in range or winter conditions.

RECOMMENDATIONS:

As in the Kalispell area, more work is needed to establish trends in the population and to increase the quantity and quality of data on herd reproduction and winter losses.

V. Big Game Survey in the Swan

DATES: March 9, 1954

PERSONNEL: R. Austin, Pilot
R. Wilson, District Warden Supervisor
P. Marshall, Jr. Biologist

TECHNIQUES USED:

The same technique was used here that was used in aerial surveys in other areas.

FINDINGS:

One flight was made in this area but due to poor flying weather a satisfactory elk census was not made. Much of the winter range of the elk was bare of snow and the elk were very hard to see. A total of 45 elk were counted from Six Mile Mountain to Napa Lookout. It was hoped that counting conditions would improve later, but they did not and another attempt to cover the Swan was not made.

On March 6, in 7.2 road miles of travel between Goat Creek and Lion Creek, 52 white-tailed deer were counted, and on May 4, 15 elk and 7 mule deer were counted on Napa Creek.

VI. Big Game Survey in the Blackfoot

DATE: February 4 and 6, 1954

PERSONNEL: R. Cooper, Pilot
P. Marshall, Jr. Biologist

TECHNIQUES USED:

The same as used in the South Fork of Flathead.

FINDINGS:

The results are tabulated below:

Area	Number of elk seen
Ovando Mountain	45
Dry Fork	3
East Fork	5
Alice Creek	54
South of Lincoln	124
Lincoln Canyon	10
Markham Mountain	83
Nevada Creek	28
Upsata Lake	6
TOTAL	358

The total of 358 elk seen does not represent the minimum of elk known to winter in the Blackfoot as it does not include those wintering on the Blackfoot-Clearwater Game Range and in that part of the Blackfoot drainage below the Clearwater River.

DISTRIBUTION

Much of the upper Blackfoot drainage is rather open country with a considerable number of ridges and low hills where snow does not accumulate to any great extent. It is on these ridges and hills that the elk winter. Few were found along the river and creek bottoms. In the lower Blackfoot, most of the elk winter range is in timbered country.

CLASSIFIED COUNTS

Two hundred twenty-seven elk were classified as 50 bulls (31 spikes), and 177 cows and calves. The ratio found was 100 bulls to 354 cows and calves. A ground count to obtain the cow-calf ratio was not made.

WINTER LOSSES, MARKHAM-MINERAL MT. AREA

Three white-tailed deer carcasses were found in 14 miles of travel in the area. One fawn, one doe (about $5\frac{1}{2}$ years) and one white-tailed deer kill of unknown sex or age were the losses found. The limited survey gave an index of 0.22 dead deer per mile of travel.

RECOMMENDATIONS:

The entire Blackfoot drainage should be divided into census units similar to those set up in the South Fork of the Flathead in order to obtain data that would be comparable from year to year. The winter range should be more accurately mapped and classified counts should be taken over a wider area. Some method of determining winter losses should be devised and range condition surveys should be made.

SUMMARY:

Big game surveys in the South and Middle Forks of the Flathead River indicated that the minimum numbers of elk in these two areas were 2,235 and 384 elk respectively. On the basis of elk per square mile of winter range, these elk populations may be expressed as 16.8 elk per square mile in the South Fork and 11.1 elk per square mile in the Middle Fork. Sex ratios in each area are adequate for herd maintenance.

Deer strip censuses near Kalispell in Flathead County and near Eureka in Lincoln County provided data for estimations of 2,488 deer and 5,665 deer respectively, or on a per square mile basis, 56.9 deer per square mile and 80.6 deer per square mile.

Big game surveys in the North Fork of the Flathead, Whitefish, Swan and Blackfoot areas were too limited to provide data on which to base management recommendations.

Prepared by:

Name P. B. Marshall

Date June 20, 1954

Approved by:

Name M. J. Rognrud

Approved by:

Montana State Department of Fish and Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-60-R-1
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report

Job No. I-B

Investigations Project

Title of Job: Big Game Survey in Bitterroot, Fish Creek, Thompson Falls,
Cherry Creek and Adjacent Areas

OBJECTIVES:

Determine the current population and distribution on this important game range. (To determine the seasonal sex and age composition of the important big game herds and survey the extent of natural losses).

TECHNIQUES USED:

Airplanes were used to census the elk herds during the winter. The censuses were accomplished in periods of favorable weather when a snow cover was present. No attempt was made to census deer in the work plan area although some local spot counts were made for possible use as indicators of population trend.

Distribution of elk was indicated by the location of animals seen. Page-size maps were not available for all the herd unit areas to record the location of elk seen and designate the winter range area.

Classified counts were obtained by traveling the deer and elk winter ranges in a manner to see the largest possible number of animals.

Several important big game winter ranges were inspected during a survey of losses. Travel was at random over the winter ranges and the distance was estimated for relation to the number of losses found. An index of deer loss per mile of travel was obtained.

Personnel on the census flights were: M. Rognrud, R. Miller, F. Hartkorn, C. Taylor, and R. Cooper of the Montana Fish & Game Department. D. Stockstad and A. Mullenax accomplished the classified counts and the survey of winter losses.

FINDINGS:

I. Censuses:

A. Bitterroot Unit

A total of 949 elk were counted along the east side winter range. In the West Fork drainage, 193 elk were tallied and 66 elk were counted along the west side canyons. The 1953 and 1954 elk counts in the Bitterroot Unit are given below:

Locality	Elk Counted 1953	Elk Counted 1954
Davis Mt.-Woodchuck Creek	64	130
Woodchuck to Willow Creek	138	95
Willow to Skalkaho Creek	71	192
Skalkaho to Rye Creek	146	138
East Fork District	366	524
West Fork District	197	193
West Side	0	66
Bitterroot Unit Totals	982	1,338

The aerial elk census was increased in 1954 and will be used as a trend count for the Bitterroot areas given above. Of particular importance was the elk count increase in the East Fork district. Some changes in distribution indicated above may be due to post-season special hunts.

Field work in the Bitterroot area resulted in an estimate of about four hundred and fifty elk in the West Fork drainage, and considerable more elk than the 66 head observed along the West side canyons.

A total of 223 mule deer was observed in the West Fork drainage.

B. Clark Fork Unit

An elk census was conducted in the Lolo Creek - Petty Creek - O'Brien Creek area. Including 86 head in upper Petty Creek which was not flown, a total of 228 elk was counted. The distribution of elk is indicated by the tabulation below:

<u>Location</u>	<u>Elk Counted</u>
O'Brien - Deep Creek	29
Lolo Creek (Sleeman)	15
Lolo Creek (Above Sleeman)	10
Petty Creek (Exept Madison)	86

<u>Location</u>	<u>Elk Counted</u>
Petty Creek (Madison Gulch)	52
Petty Creek - Albert Creek	11
Rock Creek	25
Total	228

C. Garnet Range (Bonner to Drummond)

The Garnet Range between Bonner and Drummond was flown in an attempt to census elk. Only 16 elk were seen due to poor counting conditions and heavy timber cover. Ten elk were seen in Elk Creek where 35 were found in 1953.

D. Thompson Falls--Cherry Creek

No big game census was conducted in the Thompson Falls area during the 1953-54 winter. An aerial reconnaissance found 74 elk in Cherry Creek, Prospect Creek and Dry Creek.

II. Classified Counts:

A 1953 summer classified count of 124 animals resulted in a 100 adult:35 calf elk ratio in the Bitterroot Unit. Although the sample was small a 100 bull:384 cow ratio occurred in the count to suggest bulls were approximately properly represented. More classified elk counts are needed in the Bitterroot area.

Classified counts of the winter white-tailed herds in the Thompson Falls area resulted in a 100 adult:38 fawn ratio from a sample of 367 animals. A sample of 178 white-tailed deer on the Thompson River winter range gave a 100 adult:37 fawn ratio. The white-tailed deer wintering the the Clark Fork Unit had a 100 adult:43 fawn ratio in a sample of 490 deer. The winter herd fawn increment was 37 to 43 percent of the parent herds in the Clark Fork Unit.

A limited classification of 78 elk in the Clark Fork Unit winter herds gave a 100 adult:30 calf ratio.

III. Big Game Losses

A Summary of the losses found in various areas of the Clark Fork Unit is given below:

<u>Winter Range</u>	<u>Species</u>	<u>No. Losses Found</u>	<u>Miles Traveled</u>	<u>Losses/mile of travel</u>
Thompson River	Wt. Deer	3	15	0.20
Fish Creek	M. Deer	3	14	0.22
Albert-Rock Cr.	Wt. Deer	1	7	0.14
Lolo Creek	M. Deer	0	7	0.0

Winter loss of deer appeared to be less than during former years when surveys of losses were made. However, the above samples were limited and may not represent a true index of winter losses. Time did not permit an adequate study of the winter loss problem.

RECOMMENDATIONS:

The accumulation of elk census data be continued to determine population trends.

Aerial censuses in the heavily timbered areas are not practical as a trend count method. The Garnet Range does not have a sufficient elk population to warrant a systematic coverage of elk ranges. Aerial reconnaissances may be desirable to locate and count particular elk bands.

Sex and age composition data from important deer and elk herds should be accumulated to indicate the status and reproduction of the herds.

The extent of winter losses be determined on important deer and elk winter ranges by sufficient sampling to provide confidence in the results.

SUMMARY:

The aerial elk census enumerated 1,338 elk in the Bitterroot Unit. A trend count of 228 elk was obtained in the O'Brien-Petty Creek area. Classified counts indicated a 37 to 43 percent fawn increment in the winter white-tailed deer herds of the Clark Fork Unit. Winter deer losses appeared to be less than in former years on the Clark Fork ranges.

Prepared by:

Name M. J. Rognrud

Date June 30, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. I-B Investigations Project

Title of Job: Big Game Survey in Bitterroot, Fish Creek, Thompson Falls,
Cherry Creek and Adjacent Areas

EVALUATING THE HELICOPTER FOR AERIAL
CENSUS AND HERDING OF ELK

PLACE: U. S. National Bison Range, Moiese, Montana

DATES: November 27 and 28, 1953 and December 22, 1953

COOPERATORS: U. S. National Bison Range Personnel
Fish and Wildlife Service Personnel
United States Forest Service Personnel
Montana Fish and Game Department Personnel

OBJECTIVES:

Attempts to herd elk with a helicopter on the National Bison Range were made in the winter of 1952-53. Two tries were made on consecutive days. On the first attempt 6 elk were herded over a mile and put through a 16 foot gate into a corral. On the second attempt approximately forty elk were herded over rough terrain and 20 of these were driven about two miles and put through the gate into the corral. Of the 26 elk corralled, 8 were bulls and 18 were cows. The success of these two attempts suggested further experimentation and study.

Accordingly, plans were formulated to evaluate the use of the helicopter as a herding technique with the following objectives in mind:

1. To study and analyze the technique of herding and counting elk from a helicopter.
2. To photograph the operation and use the film for scientific analyses and public education.
3. To capture elk on the National Bison Range for use in the cooperative elk feeding experiment at the blackfoot-Clearwater Game Range.

TECHNIQUES USED:

Herding attempts were conducted on November 27 and 28, 1953, with one helicopter and a ground crew of 18 men and on December 22, 1953, with two helicopters and a ground crew of 10 men. The helicopters and pilots were obtained from the Johnson Flying Service, Missoula, Montana, and the ground crew was composed of personnel from the cooperating agencies. Censusing efforts were made incidental to the herding operations.

A form sheet (Figure 1) was given the pilots and various members of the ground crew. Data from these form sheets were used to assist in the evaluation of the operation.

Preliminary to the herding operation a flight was made to locate the elk, to determine the lay of the land, and formulate last minute plans. On a basis of the information obtained, members of the ground crew were then strategically placed to assist in keeping the elk bunched and moving in the desired direction. To initiate the drive the helicopter would make several passes over the area in which the elk were located. As the elk began to move, the pilot would attempt to control their direction of movement by the manner in which he made his passes.

FINDINGS:

All three attempts to herd elk a distance of two to two and one-half miles into a small corral were unsuccessful. An evaluation of the use of a helicopter in herding elk is here presented based on two successful attempts in 1952 and three unsuccessful attempts in 1953.

The censusing attempts were very satisfactory and indicated that the use of a helicopter would be effective for censusing elk on limited areas.

The terrain of the National Bison Range made an ideal testing ground for this method of herding and censusing elk. It is a combination of steep hillsides and open grassy valleys. The hills and ridges are covered with scattered timber of Douglas fir and yellow pine and various species of grasses and shrubs.

Preliminary flights located the elk in timbered areas. The location of the corral made it necessary to drive the elk from timber across approximately three-fourths of a mile of grassy hillside, through a second area of timber, over a ridge saddle, into a steep open valley and thence up a ridge into the wings of the corral. In all attempts the animals were driven from their original location in the timber and started across the open hillside toward a stand of dense timber and windfalls. As the animals crossed the open hillside, a few would split away from the main herd. When this situation developed, the helicopter was forced to stay with the main herd or risk losing control of the entire group. As the

Figure 1.

HERDING ELK WITH HELICOPTER

Data Guide Sheet

Date _____ Place _____ Weather _____

Ground Conditions _____

Pilot _____ Other Personnel _____

Take-off Time _____ Time Elk Located _____

No. Elk in Herd _____ Composition _____

Type of Terrain _____

Behavior of Elk _____

No. Splitting _____

No. Doubling Back _____

No. Seeking Cover _____

No. Herded to Corral _____ Composition _____

Distance Moved _____ Direction _____ Dis. M. _____ Direction _____

Total Distance Moved _____ Directions _____

Time Required to Move Elk to Corral _____

No. Passes with Helicopter _____

Herding Techniques _____

Altitude _____

Herding Distance _____

Helicopter Time in Air _____

Helicopter Time on Ground _____

Number of Refuels _____

Action of Ground Parties _____

Use back of sheet for additional comments or observations.
(over)

Comments Ground Crew

Comments Pilot

Comments Observers

General Observations

animals entered the dense stand of timber, they were invariably lost to view of the pilot and repeated attempts to drive them from this area were unsuccessful.

Observers were of the general opinion that herding elk with a helicopter would be successful when the animals were to be driven only relatively short distances (two to three miles) in open country. Success also depended on keeping the elk in large groups and moving them slowly. Driving the animals at too great a speed tended to split the herd and tire the elk to the point where they became increasingly difficult to control.

RECOMMENDATIONS:

1. The helicopter could be used to census elk on limited areas.

SUMMARY:

1. Elk do not drive easily regardless of the method employed.
2. Successful elk herding operations with a helicopter could be expected in open country if the elk are driven in fairly large groups and for only relatively short distances.
3. The helicopter is suited to this type of operation because of its maneuverability, its ability to fly at a slow speed at tree-top level, and to land in inaccessible places.
4. Some disadvantages of the helicopter are its high cost of operation (about \$80.00 per hour) and its limitations under certain weather conditions. Strong to moderate winds blowing in the direction the elk are to be moved, greatly decrease the maneuverability and effectiveness of the helicopter. The helicopter used in the experiment operated most efficiently at elevations between 2,000 and 4,000 feet.
5. The success of the herding operations depends to a great extent on the pilot's knowledge of the terrain and his knowledge of the actions of the animals when driven.
6. The use of a helicopter was found to be an effective method for censusing elk on limited areas.

Prepared by:

Name D. S. Stockstad

Date May 1, 1954

Approved by:

Name M. J. Rognrud

Date May 15, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

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PROJECT NO.	W-60-R-1		
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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report

Job No. I-C

Investigations Project

Title of Job: Big Game Survey in Areas Lying East of the Continental Divide and Including the Sun River, Dearborn, Canyon Creek, Teton-Badger Ranges.

OBJECTIVES:

To determine the current big game population and distribution of big game upon this important game range. (Determine sex and age composition of the winter herds)

TECHNIQUES USED:

The Sun River elk herd and two lesser elk herds south of the Sun River range were censused during the winter. Aerial counts were made on February 11 and March 2, 1954, when a fresh snow cover was present and clear flying weather prevailed. The pilot and three observers, including a sportsmen representative, made the census flights.

A systematic coverage of the elk winter ranges was made during the census. Flight strips, with topographic or other ground features as markers, were used on the game range acquisition where concentrations of elk were found. Photographs were taken to determine the number of elk in the large band located on the game range. An attempt was made to sex the elk during flight but the sample obtained was not entirely satisfactory because emphasis was placed on merely enumerating the large bands of elk.

Personnel on the census flights were: Pilot Ray Austin; M. J. Watt, Robert F. Cooney, Merle Rognrud and Robert Neal, Montana Fish and Game Department; Clifford Rumford, sportsman; and Cliff McBratney, Pilot, made an aerial reconnaissance and spot census of the Sun River elk herd February 11, 1954.

FINDINGS:

I. Census of Elk Herds

A. Sun River Herd

The numbers and locations of elk counted are given in Table 1.

Table 1. Numbers and Location of Elk Counted in the Sun River Area
February 11 and March 2, 1954

<u>Census Unit</u>	<u>Location</u>	<u>Number of Elk Counted</u>		<u>Unit Totals</u>
		<u>February 11</u>	<u>March 2</u>	
Deep Creek	Foothills east of Ear Mt. Foothills south of Deep Cr.	Not Counted	37 14	51
North Sun River	Castle Mt. foothills	Not Counted	36	36
Sun River Canyon	Hannan Gulch Mortimer Gulch Big George Gulch Arsenic Creek Black Reef Lange Cr. - Patricks Basin Leavitt Creek Beaver Creek	15 50 61 49 - - - 13	5 35 41 24 12 10 18 18	163
		188		
North Fork Sun River	Mouth Cabin Creek	9	21	21
		9		
West Fork Sun River	Allan Camp Deadman Lkt. Ridge	Not Counted	27 2	29
Ford Creek Upper Willow Creek	Wood Creek Ford Creek Plateau Triple Pass Fairview Plateau Head of Willow Creek	-- 100 - - -	2 275 5 39 10	331
		100		
Game Range Acquisition	Home Gulch Northeast Range Northwest Range Central Range Southeast Range Sawtooth Foothills	17 1,598 125 273 - 280	64 528 47 1,140 480 53	2,312
		2,293		
Cut Rock - Lower Willow, Elk Creek	North of Cut Rock Creek East of Lime Reef Willow Creek Smith Creek Haystack Butte Elk Creek	-- - 27 - 22 -	10 16 22 28 24 2	102
		49		
Total Sun River Herd		2,639		3,045

Tentative census units are indicated and sub-totals of the elk herds for the census unit are given. Specific locations of elk seen are listed to point out the distribution of elk at the time the censuses were made.

The February census did not include the entire Sun River area. However, a minimum total count of 2,639 elk was obtained. The census was improved in March by a more complete coverage of the Sun River area to obtain a total minimum count of 3,045 elk. About seventy-five percent of the elk herd occupied the game range acquisition during early March. A similar count of elk on the game range in February suggested a majority of the elk herd occupied the acquisition area during the critical winter period.

An interesting observation was the apparent continuity of a large band of more than one thousand one hundred elk on the game range acquisition during the winter. Photographs revealed more than one thousand one hundred and fifty elk in one band February 11 and 1,102 elk in one band on March 2. It is not known whether individual animals remained in the large band but the approximate size of the band was maintained during part of the winter.

Field counting conditions and flying weather were excellent for the March 2 census. With a majority of the elk located in the open foothills of the game range it was felt that the largest minimum count of the Sun River herd to date was accomplished. The proportion of the elk herd counted by this aerial census is not known but a very high proportion of the elk on the game range was enumerated.

B. Dearborn Elk Herd

The elk counted in the Dearborn River area are tabulated below. The largest band of 124 elk was located in the foothills of the Middle Fork of the Dearborn River north of Highway 20. It appears possible that the elk wintering along the Continental Divide north of Rogers Pass may be a separate herd unit rather than a part of the Dearborn herd. Movements of elk in the Dearborn area are not well known. The numbers and location of elk counted are given in Table 2.

Table 2. Numbers and Location of Elk Counted in the Dearborn River Area
March 2, 1954

<u>Location</u>	<u>No. Elk Counted</u>
North Fork Dearborn - Grassy Hills	51
Harrison Basin - East of Bean Lake	76
Middle Fork Dearborn - Foothills N. of Highway #20	171
Continental Divide - North of Rogers Pass	38
South Fork Dearborn	<u>2</u>
Total Dearborn Herd	338

C. Canyon Creek Elk Herd

A count of 145 elk was made in the Canyon Creek area northwest of Helena March 4, 1954. The elk were wintering along the bare, wind-swept south exposed slopes of the drainage.

II. Classified Counts

An attempt was made to obtain a classified count of the winter Sun River elk herd. At the time of the aerial censuses, bulls were recorded separate from the cows and calves. During the winter period a ground observer also recorded bulls and antlerless elk on the game range acquisition. A satisfactory count of calves in the winter herd was not obtained.

The proportion of 100 bulls to 396 antlerless elk was recorded during the February 11th census. However, this ratio may not be representative of the herd because bulls were not distinguished in the large bands of elk on the game range. Ground counts on the game range gave a ratio of 100 bulls to 921 antlerless elk. The March 2 census resulted in a ratio of 100 bulls to 663 antlerless elk in bands outside the game range. The weighted average ratio from 3,468 classified animals was 100 bulls to 714 antlerless elk.

The classified counts indicated a higher proportion of antlerless elk occupied the game range acquisition than were present off the game range during the winter. Assuming a 100 calf to 400 or 500 cow ratio in the Sun River herd, the sex ratio becomes 100 bulls to 536 or 572 cows from the 100 bull to 714 antlerless elk ratio. This proportion of sex and age classes appears to be approximately normal in the Continental unit elk herds of Western Montana.

III. Miscellaneous Data

Aerial observations indicated the snow was deep in the upper Sun River drainage. Practically no elk were wintering above the head of Gibson Lake.

Wintering concentrations of mule deer were observed in the Sun River area, particularly in the foothills north of Sun River Canyon in the Teton River drainages. A count of 80 mule deer and 20 white-tailed deer was made in Wagner Gulch March 10, 1954. Numerous white-tailed and mule deer wintered in Hannan, Blacktail and Mortimer Gulches of the Sun River Canyon.

RECOMMENDATIONS:

Considering the actual count of more than three thousand elk in the Sun River herd a harvest of 600 - 800 animals should be made to maintain the herd at its present size.

Census units should be used to accomplish and report trend counts of the Sun River herd in the future. The counts should be made in February or early March when a maximum number of elk are located on the game range acquisition.

Classified counts of the winter and summer herds should be obtained to determine reproduction and forecast the harvest to be made. The winter sex ratio can be obtained from the aerial census and the proportion of calves may be determined in January as the elk bands are herded onto the game range. Summer classified counts should be obtained as background information for more intensive management of the elk herd in the future.

SUMMARY:

Aerial censuses were made of the Sun River, Dearborn, and Canyon Creek elk herds during the 1953-54 winter season. A total minimum count of 3,045 elk in the Sun River herd was obtained. About seventy-five percent of the elk herd occupied the game range acquisition. A ratio of 100 bulls to 714 antlerless elk was found.

A total of 338 elk was counted in the Dearborn River drainages. The aerial census in the Canyon Creek area revealed 145 head of elk.

Prepared by:

Name M. J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

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The proportion of 100 bulls to 396 antlerless elk was recorded during the February 11th census. However, this ratio may not be representative of the herd because bulls were not distinguished in the large bands of elk on the game range. Ground counts on the game range gave a ratio of 100 bulls to 921 antlerless elk. The March 2 census resulted in a ratio of 100 bulls to 663 antlerless elk in bands outside the game range. The weighted average ratio from 3,468 classified animals was 100 bulls to 714 antlerless elk.

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Classified counts of the winter and summer herds should be obtained to determine reproduction and forecast the harvest to be made. The winter sex ratio can be obtained from the aerial census and the proportion of calves may be determined in January as the elk bands are herded onto the game range. Summer classified counts should be obtained as background information for more intensive management of the elk herd in the future.

SUMMARY:

Aerial censuses were made of the Sun River, Dearborn, and Canyon Creek elk herds during the 1953-54 winter season. A total minimum count of 3,045 elk in the Sun River herd was obtained. About seventy-five percent of the elk herd occupied the game range acquisition. A ratio of 100 bulls to 714 antlerless elk was found.

A total of 338 elk was counted in the Dearborn River drainages. The aerial census in the Canyon Creek area revealed 145 head of elk.

Prepared by:

Name M. J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana	
PROJECT NO.	W-60-R-1	
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VOL.	V	NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. I-D Investigations Project

Title of Job: Big Game Survey in the Flint Creek, Rock Creek, Garnet and Little Blackfoot Areas

OBJECTIVES:

To determine the current big game population and distribution upon this important game range area.

TECHNIQUES USED:

Airplanes were used to census the elk herds. Flights were made during periods of favorable weather when a snow cover was present. Department personnel making the census flights were M. Rognrud and R. Cooper. Sportsmen representatives and U.S.F.S. personnel also participated in the elk counts.

FINDINGS:

I. Censuses

A. Flint Creek Range

The Flint Creek Range elk census was carried out March 2 and 3, 1954. A total of 689 elk was counted in the Flint Range Unit. A band of 115 elk was found in the Lime Kiln Gulch area (Garrity Hill) south of Highway 10-A. The latter group probably is not a part of the Flint Range elk herd and will be treated separately until its relationship to the Flint Range herd is known.

The numbers and distribution of elk censused are given below:

Number of Elk Counted and Distribution of Elk in the Flint Creek Range

<u>Locality</u>	<u>Number of Elk Counted</u>	
	1953	1954
Porter's Corner	22	27
Fred Burr Creek	-	64
Boulder Creek	-	30
Dunkleburg Creek	148	68

<u>Locality</u>	<u>Number of Elk Counted</u>	
	<u>1953</u>	<u>1954</u>
Gold Creek	14	26
Tincup - Rock Creek	54	104
Powell Creek	-	7
Dempsey Creek)		38
Racetrack Creek)		120
Modesty Creek)	353	30
Timber Gulch)		30
Olson Gulch)		145
Lime Kiln Gulch (Garritty Hill)	(178)	(115)
	<u>591</u> (769)	<u>689</u> (804)

The elk count was larger in 1954 than in 1953. However, the difference in counts is attributed to an improved census in 1954. More census experience in the area should establish trends in herd size.

A high proportion of the elk counted were cows and calves. Because bulls were not properly represented in the count, it was assumed they wintered in small groups and as scattered individuals and were not censused. The Flint Creek Range herd thus was estimated to have 800 - 1,000 elk.

B. East Garnet Range (Drummond-Helmville-Avon Triangle)

An aerial elk census March 3 in the east Garnet Range resulted in a tally of 183 head. The numbers and distribution of elk counted are given below:

<u>Location</u>	<u>Elk Counted</u>
Warm Springs Creek (Garrison)	32
Carter Creek	23
Hoover Creek	27
Chimney Creek	56
Cottonwood Creek (Helmville)	39
McDonald Creek (Little Blackfoot)	<u>6</u>
Total	183

The 1954 elk count in the east Garnet Range is larger than the 1953 count (97) elk. Elk were distributed over the west and south exposed portion of the range in rather small groups which made censusing difficult. The difference in counts were attributed to better counting conditions in 1954. Hunters have not killed sufficient numbers of elk in the area to account for the difference in counts. More census experience is needed in the area to establish trends in herd size.

C. Little Blackfoot River

A total of 456 elk was counted in the Little Blackfoot and Cottonwood Creek (Deer Lodge) drainages on March 3, 1954. The numbers and distribution of elk counted are given below:

<u>Locality</u>	<u>No. Elk Counted</u>
Treasure Mountain	14
Elliston Creek Hill	18
Elliston Creek - Spotted Dog Creek	103
West of Spotted Dog Creek (to Highway 10-A)	50
East of Highway 10 Garrison-Deer Lodge (Freezeout, Burr Creek)	<u>271</u>
Total	456

A thorough coverage of this elk range was not made. More census experience is needed in the area west of the Continental Divide and east of Highway 10-A and 10. Elk may winter in the Cottonwood Creek and Peterson Creek Drainages east of Deer Lodge which were not censused in 1954.

II. Classified Counts

Classified counts were not obtained during the project period.

III. Miscellaneous Data

A count of 92 mule deer and 12 white-tailed deer was made March 4, 1954 along the west Garnet Range from Highway 10 between Drummond and Bonner. This record may be useful as a trend count.

RECOMMENDATIONS:

The accumulation of trend counts and distribution information of the important deer and elk herds in the work plan area be continued.

SUMMARY:

Elk censuses were conducted in the work plan area during the 1953-54 winter season. A total of 689 elk was counted in the Flint Creek Range, 456 elk in the Little Blackfoot area, and 183 elk in the East Garnet Range.

Prepared by:

Name M. J. Rognrud

Date June 30, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. III-A Investigations Project

Title of Job: Tagging and Release of Elk on the Blackfoot-Clearwater Game Range.

OBJECTIVES:

To tag and release as many elk on the Blackfoot Game Range as possible. Recover tags at checking stations and analyze data for migration. To provide information in the summer and early fall range utilized by elk wintering on the Blackfoot-Clearwater Game Range.

TECHNIQUE USED:

The semi-permanent corral type trap located on the Game Range about a mile northwest of the headquarters was used in the tagging operation. Elk were trapped throughout the winter by baiting them into the trap with meadow hay and 20 percent protein stock pellets. They were tagged with broad aluminum ear tags and released at the trapping site. The trap was baited each day and set about once a week.

FINDINGS:

At the end of the 1953-54 elk trapping season there were at least 136 tagged elk on the Blackfoot-Clearwater Game Range. Sixty-six unmarked elk were trapped and tagged during the season. Thirty were marked animals that had been tagged during the 1951-52 trapping season and 40 tagged elk were transplanted on the game range from Yellowstone National Park. Other tagged elk from the 1951-52 catch were probably in the area but were not retaken this year. Records of the tagged animals are on file at the Game Range headquarters and at the Helena office of the Fish and Game Department.

DISCUSSION:

The Lincoln index method was employed to determine the number of elk utilizing the feed line leading to the trap. After tagged animals were released into the population it was possible

to estimate the number of animals using the bait by the ratio of tagged to untagged elk in each trap catch. The assumptions of adequacy and randomness of the sample must, of course, be considered and evaluated. A trap catch was not considered a valid sample unless at least 25 elk were captured. It was further assumed that the trapping operations neither made the elk trap shy nor turned them into trap bums.

Considering the method to be valid in this instance, the numbers of elk feeding on the trap bait line were as follows:

January 26, 1954	113
February 2, 1954	135
February 16, 1954	197
February 27, 1954	247
March 8, 1954	109

These numbers seem logical. They could be expected to increase during the severe part of the winter and diminish as the weather became warmer and the snow started to melt from the more exposed portions of the range.

The elk transplanted from Yellowstone National Park were released on the Blanchard Flat area of the game range. A feed line in Elk Basin was used to keep the elk in the release area. An estimated 20 - 30 local elk also used this feed line and it is thought probable that some of the later were elk transplanted from the Park in the early spring of 1953. None of these animals released in 1953 were trapped this past season.

One bit of interesting information was gained last winter when a cow tagged in March 8, 1953, in Danaher Basin was recaptured on the Blackfoot-Clearwater Game Range in February, 1954. Apparently elk do not always winter in the same area year after year.

Tag returns were received on six cows killed during the 1953 hunting season. Four of these elk were transplants from Yellowstone National Park in the spring of 1953. Only one had traveled any considerable distance and she was killed near Lincoln, Montana. Two cows were killed on or near the game range that had been tagged there in the winter of 1951-52.

RECOMMENDATIONS:

It is recommended that another semi-portable elk trap be operated in the Blackfoot area next winter. The trapping season is relatively short and the additional trap would enable a larger number of animals to be marked and accomplish the study of elk movements in a relatively shorter period of time.

It is recommended that a combination hay storage shed and trap be constructed in Elk Basin to make possible the trapping and tagging of a part of the transplanted elk next winter. The results of this operation will suggest whether it is possible to

maintain two distinct wintering elk herds in such close proximity to one another (about four miles). Elk trapping at this site may also indicate the advisability of transplanting elk on the game range for hunting.

More emphasis should be placed on the recovery of tags from animals killed during the hunting season.

SUMMARY:

Three elk traps were operated during the 1953-54 winter trapping season. The Blackfoot-Clearwater Game Range trap caught 96 elk of which 66 head were not marked in previous years.

A cow elk tagged at Danaher during March, 1954 was trapped at the Blackfoot Game Range during the 1954 winter season. Six tag returns of Blackfoot elk were obtained during the 1953 hunting season.

Prepared by:

Name Wes Woodgerd

Date June 15, 1954

Approved by:

Name M. J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. III-B Investigations Project

Title of Job: Tagging and Release of Elk in the Bitterroot

OBJECTIVES:

To determine the movement and migration of elk in the Bitterroot Unit and the relation of these elk to Idaho and other elk herds. To determine the ranges occupied by Bitterroot herds during the hunting season.

TECHNIQUES USED:

A semi-portable corral type elk trap was set up on "Barley Ridge" between Reimel and Tolan Creeks of the East Fork of the Bitterroot River. The trap was baited with meadow hay and 20 percent protein pellets. Elk were trapped from December 22, 1953 through February 4, 1954. Broad aluminum tags were placed in each ear with plastic markers for possible sight records during the summer season.

FINDINGS:

A total of 33 elk was marked during the trapping season. The catch was comprised of 5 bulls, 21 cows and 7 calves. Records of the marked animals are on file at the project headquarters at the Helena office of the Fish and Game Department.

During the trapping season three elk were caught twice. It was noted that heavy plastic markers made from poker chips were more durable than the lighter plastic used at the beginning of the trapping operation.

It is planned to emphasize recovery of the tags from marked elk during the coming hunting season.

RECOMMENDATIONS:

It is recommended that another elk trap be operated in the Bitterroot area during the 1954-55 trapping season. The objective of the increased trapping effort would be to mark more elk during the short trapping season to conclude the study of movements in a minimum period of time.

SUMMARY:

The first season of trapping in the Bitterroot area resulted in 33 tagged elk.

Prepared by:

Approved by:

Name M. J. Rognrud

Montana State Department of Fish and Game

Date June 20, 1954

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. III-C Investigations Project

Title of Job: Tagging and Release of Elk in the Upper South Fork of the Flathead and the Sun River

Due to lack of time and personnel and the priority of other work plans, no work was done on the trapping and tagging of elk in the upper South Fork of the Flathead River (Danaher).

Elk trapping efforts on the Sun River Game Range were not successful. Due to high winds it was necessary to locate the trap in the timber on the edge of the territory utilized by the wintering elk bands. Furthermore, due to the availability of natural forage the small numbers of elk in the trap area were not attracted by the meadow hay and pellet bait. Late in the trapping season alfalfa hay was used as bait and found more attractive to elk on the game range.

Twenty-four elk were trapped during the 1953-54 season and the records are available at the Game Range headquarters and the Helena office of the Fish and Game Department.

Elk tagging on the Sun River Game Range is further handicapped by the policy of not disturbing the elk bands on the game range. The trapping activity has been incidental to other game range activities and without specific personnel to carry out the trapping phase of the work plan, full efforts were not made to have a successful trapping and tagging operation.

RECOMMENDATIONS:

It is recommended that the problems encountered in obtaining a satisfactory trapping and tagging program on the Sun River Game Range be studied to determine whether trapping efforts should be discontinued.

Prepared by:

Name M. J. Rognrud

Date June 20, 1954

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By Faye M. Couey, Assistant Director

Wildlife Restoration Division

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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report

Job No. IV-A

Investigations Project

Title of Job: Forage Utilization on Key Areas

PERSONNEL: L. Haverlandt, Deputy Game Warden
A. Mullenax, Fieldman
M. Rognrud, Sr. Biologist
P. Marshall, Jr. Biologist

OBJECTIVES:

To determine the browse species used and the extent of browse utilization in important big game ranges.

TECHNIQUES USED:

Three areas were chosen on which to conduct the browse utilization surveys. One area was the Bowser Lake Range about fifteen miles northwest of Kalispell. A second area was in eastern Lincoln County, in the vicinity of Graves Creek in the Tobacco River drainage. In addition, the same method was used in the three rather limited areas of the Swan Valley-- at Holland Lake, Condon, and Goat Creek, but these were much less intensive and were intended only to provide a more objective method of judging range condition rather than to provide a quantitative measure of forage utilization.

Both the Bowser Lake area and the Graves Creek area are exclusively deer winter ranges, with white-tailed deer only on the Bowser Lake area and about eighty percent white-tailed deer and twenty percent mule deer on the Graves Creek Range. White-tailed deer and elk were present on the inspected area of the Swan Valley.

The method used was that described by Shaler Aldous, 1944 Jour. Mammalogy, 25 (2):130-136. This is an ocular estimate method for determining forage utilization.

The routes followed were the same as some of those followed during deer strip censuses in the Bowser Lake and Graves Creek areas in February. Plots were spaced at approximately two chain intervals.

FINDINGS:

The data obtained is presented below.

A. Bowser Lake Area

Number of Plots - 358

Occurrence in plots:

Douglas Fir	266	Serviceberry	75
Snowberry	335	Ribes	15
Nannyberry	56	Ninebark	30
Rose	112	Lodgepole pine	7
Mountain Maple	53	Ceanothus	2
Dwarf Juniper	46		

<u>Species</u>	<u>% of Cover</u>	<u>Average Density</u>	<u>Average Utilization</u>	<u>Utilization Factor</u>	<u>% in Deer Diet</u>
Douglas Fir	39.7	18.8	26.1	490.7	56.3
Snowberry	47.9	22.7	5.9	133.9	15.4
Mt. Maple	3.4	1.6	81.9	131.0	15.0
Nannyberry	4.4	2.1	22.9	48.1	5.5
Serviceberry	1.1	0.5	87.3	43.6	5.0
Rose	1.1	0.5	18.0	9.0	1.0
Dwarf Juniper	1.9	0.9	7.4	6.7	0.7
Other	0.6	0.2	29.2	2.4	0.2

The data indicate that this range is not in good condition. Two of the three species making up 86.7 percent of the browse diet of the deer are generally considered to be inferior deer forage. Furthermore, heavy reliance is placed on one species, Douglas fir, a fact in itself indicative of poor forage conditions. Only one preferred browse species, mountain maple, provided an appreciable amount of forage. Maple is not widespread over the range, but occurs in only three stands of any abundance and these are small. Much of this maple is not available to the deer, as most of the shrubs have grown out of their reach.

Serviceberry, a highly preferred species, is in danger of disappearing from this range. No vigorous shrubs of serviceberry were seen and no reproduction was found. All shrubs of this species that were observed had been severely overused in the past and do not now produce an appreciable amount of forage.

The center of overuse on this range is the immediate vicinity of Bowser Lake. The water of this lake is highly mineralized and seems to have a great attraction for deer. At increasing distances from the lake, the degree of overuse declines although even on the periphery of the range, some overuse is evident.

The percentage of browse in total diet of the deer is not known. Deer are very often seen in fields in this area and may obtain a considerable amount of forage there.

B. Grave Creek Area

Number of Plots - 304

Occurrence in plots:

Serviceberry	46	Rose	142
Douglas Fir	145	Alder	8
Red-Osier Dogwood	24	Willow	8
Snowberry	217	Aspen	9
Nannyberry	43	Other	22

<u>Species</u>	<u>% of Cover</u>	<u>Average Density</u>	<u>Average Utilization</u>	<u>Utilization Factor</u>	<u>% in Deer Diet</u>
Serviceberry	7.2	1.9	95.0	180.5	32.4
Douglas Fir	40.5	10.7	14.0	149.8	26.9
Red-Osier Dogwood	4.2	1.1	100.0	110.0	19.8
Snowberry	33.7	8.9	4.8	42.7	7.7
Nannyberry	6.8	1.8	13.7	24.6	4.4
Rose	5.3	1.4	16.8	23.5	4.2
Alder	0.7	0.2	51.2	10.2	1.8
Willow	0.4	0.1	71.2	7.1	1.3
Aspen	0.4	0.1	55.0	5.5	1.0
Other	0.7	0.2	11.8	2.4	0.4

This range is not in as critical condition as the Bowser Lake range. However, overutilization is occurring. As in the Bowser Lake area, three species are carrying the load of deer foraging but the utilization is more evenly distributed over the three and two of them are good forage species. The utilization of serviceberry and red-osier dogwood is much more than is desirable. Neither of these two species is widespread over the range, which is a contributing factor to their overuse. Again it is not known just what percentage of the total diet of the deer is composed of browse.

C. Swan Valley

The results of the survey in the Swan Valley indicated that the range has been overused in the past and some areas are being overused at present. During the past winter, the Holland Lake range received the lightest use of the three areas inspected and the Goat Creek range received the heaviest use. The range as a whole is in rather poor condition with a predominance of the less preferred browse species such as ocean spray, snow-berry and nannyberry.

RECOMMENDATIONS:

Immediate steps should be taken for the restoration of the Bowser Lake and Grave Creek ranges. Deer herds in these two areas should be reduced and maintained at the reduced level until the ranges show signs of improvement. At the same time, intensive studies of range condition should be initiated in these areas and the Swan Valley.

SUMMARY:

Forage utilization surveys in three western Montana areas indicated overutilization of browse plants on all three ranges. The Bowser Lake range northwest of Kalispell received the greatest degree of overuse during the past winter, followed by the Grave Creek range in eastern Lincoln County and the Swan Valley range in Lake and Missoula Counties.

Prepared by:

Name P. B. Marshall

Date June 20, 1954

Approved by:

Name M. J. Rognrud

Date June 30, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-60-R-1
DATE	July 15, 1954
VOL. V	NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. IV-A Investigations Project

Title of Job: Forage Utilization on Key Areas

DATES: March - April, 1954

PERSONNEL: D. S. Stockstad, Jr. Biologist
 Al Mullenax, Jr. Fieldman

OBJECTIVES:

To determine the use on the browse plants in various big game wintering areas.

TECHNIQUES USED:

Plots of 11.7 feet radius equaling 1/100 of an acre were examined in various areas of the wintering ranges. Plots were randomly distributed in the areas of the range containing browse. Occular estimates were used to determine the percentage of annual growth used and the crown area of each species within the plot.

Since this work was done in conjunction with a winter kill survey, no attempt was made to determine the percentage of the range covered by browse, grass or herbs.

FINDINGS:

The findings for the various areas are given in Tables 1 through 5.

DISCUSSION:

Limited studies on browse utilization in various big game wintering areas indicated that the preferred browse species in these areas are being overutilized. The browse on the Mineral-Markham Mountain Area appeared to be overused to the extent that unless herd reduction on the winter range can be accomplished in the very near future, it is doubtful if the preferred browse species can continue to exist. The browse in the Nine Mile Area appeared to more closely approach correct usage than in any other area.

TABLE I.

BROWSE UTILIZATION IN THE NINE MILE CREEK AREA

<u>Species</u>	<u>Percent of Annual Growth Used</u>	<u>Percent of Species in Browse Portion of Game Diet</u>
Serviceberry	41.6	83.5
Chokecherry	35.0	9.6
Rose	29.7	2.9
Snowberry	7.1	2.0
Hawthorne	5.0	trace
Oregon Grape	5.0	2.0
Kinnikinnic	5.0	trace

Data obtained from 40 plots

TABLE II.

BROWSE UTILIZATION IN THE LOLO CREEK AREA

<u>Species</u>	<u>Percent of Annual Growth Used</u>	<u>Percent of Species in Browse Portion of Game Diet</u>
Serviceberry	64.4	49.0
Chokecherry	50.2	26.0
Rose	44.3	9.0
Mock Orange	41.0	1.0
Mountain Maple	21.7	0.7
Snowberry	19.6	2.0
Nine Bark	10.2	10.0
Spiraea	5.0	1.0
Sage Brush	5.0	0.1
Oregon Grape	5.0	0.1
Kinnikinnic	5.0	0.2
Nannyberry	5.0	trace
Dogwood	5.0	0.3

Data obtained from 100 plots.

TABLE III.

BROWSE UTILIZATION IN THE THOMPSON RIVER AREA

<u>Species</u>	<u>Percent of Annual Growth Used</u>	<u>Percent of Species in Browse Portion of Game Diet</u>
Serviceberry	89.0	40.5
Mock Orange	77.5	1.1
Mountain Maple	65.0	0.8
Ribes	61.7	5.3
Rose	58.6	16.8
Chokecherry	57.0	1.7
Nannyberry	53.3	0.1
Snowberry	29.4	19.7
Oregon Grape	27.0	5.4
Spiraea	18.9	0.9
Ocean Spray	17.5	trace
Kinnikinnic	8.0	7.6

Data obtained from 100 plots.

TABLE IV.

BROWSE UTILIZATION IN THE MINERAL-MARKHAM MOUNTAIN AREA

<u>Species</u>	<u>Percent of Annual Growth Used</u>	<u>Percent of Species in Browse Portion of Game Diet</u>
Chokecherry	100.0	29.5
Serviceberry	100.0	15.0
Bitterbrush	100.0	1.2
Snowberry	88.5	17.7
Rose	77.5	1.7
Mock Orange	75.0	12.8
Sage Brush	68.3	21.9
Spiraea	35.6	0.3

Data obtained from 100 plots.

TABLE V.

BROWSE UTILIZATION IN THE MILLER CREEK AREA

<u>Species</u>	<u>Percent of Annual Growth Used</u>	<u>Percent of Species in Browse Portion of Game Diet</u>
Serviceberry	69.6	45.7
Chokecherry	49.5	12.3
Bitterbrush	44.4	16.3
Rose	28.8	1.1
Oregon Grape	25.0	1.1
Mountain Maple	17.5	2.9
Nine Bark	15.6	10.2
Mock Orange	13.3	0.7
Snowberry	7.0	7.6
Kinnikinnic	5.0	0.6
Spiraea	5.0	trace
Alder	5.0	1.0
Sage Brush	5.0	0.2
Ribes	5.0	0.1

Data obtained from 60 plots.

However, the small number of plots taken in this area may not represent a true picture of the entire range.

RECOMMENDATIONS:

Herd reductions on the wintering ranges studied are necessary if the important browse species are to continue to produce forage for big game animals. The studies on various winter ranges during the past winter should serve as a base from which more intensive investigations could begin.

SUMMARY:

Serviceberry appeared to be the important browse species in the diet of big game on the surveyed ranges. Overutilization of the preferred browse species was found in the five inspected big game wintering areas.

Prepared by:

Name D. S. Stockstad

Approved by:

Montana State Department of Fish and GameDate: June 20, 1954By: Faye M. Couey, Assistant Director

Approved by:

Wildlife Restoration DivisionName Merle J. Rognrud

STATE	Montana
PROJECT NO.	W-60-R-1
DATE	July 15, 1954
VOL.	V NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. V-A Investigations Project

Title of Job: Mountain Sheep Census and Distribution

OBJECTIVES:

Census all bands of mountain sheep in western Montana and determine their year around range.

TECHNIQUES USED:

The census of mountain sheep was largely accomplished by ground observation. An aerial census was made at the Wildhorse Island herd in the spring of 1953 and of the Rock Creek herd in May, 1954. No special techniques were used other than to travel the mountain sheep ranges during the winter season.

FINDINGS

A. Sun River Mountain Sheep Herd

The Sun River mountain sheep census was conducted during December, 1953, and a report submitted in the October-December, 1953 Quarterly Report of the Wildlife Restoration Division. A total of 242 sheep was tallied in 1953. The largest count of the herd in 12 years was 290 head in 1952.

B. Wildhorse Island Mountain Sheep Herd

The Wildhorse Island mountain sheep herd was investigated by graduate student Herman Ogren during 1953. A census of the herd was reported in the January-March 1953 Quarterly Report of the Montana Cooperative Wildlife Research Unit. Considering the available census and reproduction information available, it is probable that about seventy-seven mountain sheep were on the island prior to the 1954 lambing season. The aerial censuses in the spring of 1953 found 59 older sheep and 13 lambs of the year.

C. Thompson River Mountain Sheep Herd

In so far as can be determined the Thompson River herd is now extinct. No mountain sheep have been seen or reported on this range for several years.

D. Rock Creek Mountain Sheep Herd

Three counts were made of the Rock Creek herd during the winter and spring of 1954. A ground count February 16, 1954, revealed 44 head on the range. On March 4, 1954, a total of 48 sheep was counted. An attempt to make an aerial "green grass count" on May 12, 1954, resulted in only 31 sheep accounted for. A report of 63 head counted in 1954 was received from a reliable source.

E. Miscellaneous:

Three mountain sheep were seen in the head of Basin Creek in the South Fork of the Flathead River during July, 1954.

RECOMMENDATIONS:

Trend counts of the mountain sheep herds should be continued. Particular attention should be given to the hunted herds.

The aerial census method may be used satisfactorily on the Wildhorse Island herd.

Consideration should be given to increasing the distribution of mountain sheep in western Montana by trapping sheep from the larger Montana herds and transplanting them on historical ranges.

Prepared by:

Name Merle J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish & Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana		
PROJECT NO.	W-60-R-1		
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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report

Job No. V-B

Investigations Project

Title of Job: Mountain Sheep Herd Classification and Sex Ratio Determination

OBJECTIVES:

To determine the percentage of adults, yearlings and lambs in each sheep herd and classify the rams by age classes in so far as possible.

TECHNIQUES USED:

At the time that ground counts were made, the sex and age of identified animals were recorded. Classified counts were accumulated to derive the sex and age ratios.

FINDINGS:

The sex and age composition at the Sun River mountain sheep herd was given in the October-December, 1953 Quarterly Report. However it was felt due to stormy weather the classified count was not entirely satisfactory and that the herd should be classified again during the winter. Results of the past winter counts are given below.

Herd composition information from the Rock Creek and Wildhorse Island sheep herds are presented with the Sun River counts as a record and for comparative purposes.

During July, 1954 an observation was made of 10 lambs, and 15 ewes and yearlings in one band of the Ural-Tweed herd in Lincoln County, Montana.

The 12 year average composition of the Sun River mountain sheep herd should be representative of an unhunted sheep herd in western Montana for the purposes of management. The proportion of rams is seen to approximately agree in the three unhunted herds. If the 17 Sun River rams killed in 1953 are added to the 1953-54 average count, the herd composition becomes 25.6 percent rams, 56.5 percent ewes and yearlings, and 17.9 percent lambs.

SEX AND AGE COMPOSITION OF THREE WESTERN MONTANA MOUNTAIN SHEEP HERDS

Mountain Sheep Herd	Season of Count	Rams		Yearlings		Lambs		Totals Classified	
		No.	%	No.	%	No.	%	No.	%
Sun River	Dec., 1953	43	23.6	112	61.5	27	14.7	182	100.0
	March, 1954	31	19.7	89	56.7	37	23.6	157	100.0
	Av., 1953-54	74	21.8	201	59.3	64	18.9	339	100.0
	Av., 1941-52*	506	31.6	758	47.4	336	21.0	1600	100.0
Rock Creek	Feb., 1954	13	29.6	24	54.5	7	15.9	44	100.0
Wildhorse Island**	Post-Lambing, 1953	25	31.6	39	49.4	15	19.0	79	100.0

* Average of 12 years (1941-1952 inclusive) classified counts of the Sun River herd prior to hunting and concentrated predator control. Herd losses due only to limited trapping and natural causes. Yearling rams were included with older rams when identified but field error probably resulted in some yearling rams classified with ewes. The 12 year average of "ewes" is recorded above as ewes and yearlings.

** Derived from Ogren's composition data, January-March and April-June, 1953, Quarterly Reports of the Montana Cooperative Wildlife Research Unit.

Assuming the Sun River herd had 300 sheep (290 counted, 1952), the hunting removal in 1953 amounted to 5.7 percent of the herd. This percentage deducted from the 12 year average of rams results in 25.9 percent rams in the 1953-54 winter herd. It appears the latest field count of rams may have been low. If yearling rams were not included in the 12 year average of rams but were included in the 1953-54 count of rams, a closer agreement of data would have occurred. The classified counts have been compared and tested with known losses to indicate the relationships of rams to the composition and size of the herd. The 1953 hunting removal amounted to 15 - 20 percent of the older ram population in the Sun River herd.

The 12 year average sex and age ratio of the Sun River sheep herd was 66 rams: 100 ewes: 44 lambs. Adult to lamb ratios from the above three herds were: Sun River - 12 year average of 100 adults: 26 lambs, 1953-54 average of 100 adults: 23 lambs; Wildhorse Island - 100 adults: 23 lambs; Rock Creek - 100 adults: 19 lambs.

The percent annual increment to the parent herd is represented by the number of lambs in the adult lamb ratio. The Sun River herd increment averaged 26 percent lambs during December of a 12 year period.

A predator control program was conducted on the Sun River sheep range during the winters of 1952-53 and 1953-54. Herd composition counts do not indicate any increase in lamb increment after predator control was initiated. The 1953-54 lamb increment is less than the 12 year average prior to predator control. Annual variations in lamb increment certainly occur as do variations in accuracy of the classified counts.

It was not determined whether the predator control program had any effect on the winter survival of lambs. Yearlings were recorded with the ewes in the 1953-54 classified count and only yearling rams were distinguished in counts prior to 1953. Field error in classification would affect the proportion of yearling rams distinguished each year and even if an equal number of yearling ewes were assumed, the records may not be sufficiently reliable to make a satisfactory analysis of this possible effect of predator control.

Reproduction of the Rock Creek sheep herd appears to be lower than the Sun River or Wildhorse Island herds. Although only a single classified count was obtained, a high proportion of the herd was seen, and the orientation of the sheep range made it likely that most of the lambs were counted. More classified counts of this herd are needed before the 1954 hunting season recommendations can be made.

RECOMMENDATIONS:

The accumulation of mountain sheep herd sex and age composition data should be continued with emphasis on the hunted herds. Reproduction in the Rock Creek herd should be checked and if confirmed to be lower than other herds, the cause should be determined for possible improved management.

All mountain sheep herds need ecological investigation as personnel and funds are available to plan long time management. It appears specific management plans are needed for each herd.

SUMMARY:

The sex and age composition of the Sun River Mountain sheep herd over a 12 year period prior to hunting and predator control was 66 rams: 100 ewes: 44 lambs. An average 100 adults: 26 lambs ratio was found over the same period. The proportion of rams in three unhunted herds appeared to be approximately the same. The annual lamb increment to the parent Sun River sheep herd averaged 26 percent over the 12 year period prior to 1953. The 1953-54 lamb increment from classified counts, when compared to the 12 year average increment, showed no increase following predator control in the Sun River sheep range.

Prepared by:

Name Merle J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish & Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-60-R-1
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. VI-A and VI-B Investigations Project

Title of Jobs: VI-A Study of Movements and Migration of Mountain Goats

VI-B Age Determination by Tooth Wear and Replacement

Time and personnel were not available to accomplish any work
on the above job plans during the past project period.

Prepared by:

Name Merle J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish and Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

Date July 15, 1954

STATE Montana
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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report

Job No. V-C

Investigations Project

Title of Job: Value of Salt in Mountain Sheep Management

The lack of time and personnel did not permit any work on this job during the past project period.

Prepared by:

Name Merle J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish & Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana
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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. VI-C Investigations Project

Title of Job: Sex Ratio and Herd Reproductive Studies (Trend Count of Mountain Goats in the Bitterroot Unit)

OBJECTIVES:

To determine the trend of the mountain goat population in the Bitterroot Unit.

INTRODUCTION:

Census of goats is a difficult task due to the rough habitat occupied by this species. Ground counts require time and effort seemingly out of proportion to the results obtained. Aerial counts of the goats in the Bitterroot range were initiated in 1948 to determine the merits of this type census and to establish a basis for determining the goat population trend. Similar aerial counts were made in 1950 and 1954.

The history of this Bitterroot goat herd suggests that the population decreased from 1925 to 1947. Hunting was thought to be partially responsible for the decline in goat numbers in view of the fact that their habitat in the Bitterroot Range is a series of canyons relatively accessible to hunters. There has been no legal hunting of goats in this herd since 1948.

A report of the 1948 and 1950 census is recorded in the October-December 1950 Montana Pittman-Robertson Quarterly.

TECHNIQUES USED:

Aerial counts were made in May each year when the south slopes were bare of snow approximately one-half the way up each canyon. At this season it is thought that most of the goats are present on the bare slopes.

A four-passenger Stinson airplane was used for the 1954 census. The flight on May 19 was made with only one observer. The flight on May 20 was made with three observers and the flight

on May 29 was made with two observers.

The plane was flown up the canyon along the upper portion of the bare slope area and returned near the valley floor. In this manner most of the goat habitat in each canyon was under observation. The time flown over goat habitat in each canyon was recorded. The elevations used in former censuses were repeated as nearly as possible. Goats observed were recorded and a special effort was made to locate kids with any goats observed.

Results are expressed in terms of air minutes flown over goat range per animal seen.

Personnel on the flights of May 19, 20 and 29, 1954, were Courtney Taylor, Warden-Pilot; Fred Hartkorn, Biologist; and Bitterroot sportsmen were observers.

FINDINGS:

A summary of the 1948, 1950 and 1954 censuses is given in Table 1. The results suggest a decrease in the goat population in 1954 compared to 1948 and 1950.

A canyon by canyon summary of the 1954 observations is given in Table 2. A good distribution of goats over the Bitterroot Range is indicated as goats were observed in all the larger canyons.

The results of counts made in the same canyons with pilot and one observer on May 19 and with pilot and two observers on May 29 are given in Table 3. The difference in results of these counts seems significant. Possibly the goats had drifted up the canyons during the ten day interval which resulted in a lower observed density. The aerial census routes are very specific and may be subject to variations between the counts to give non-comparable results.

RECOMMENDATIONS:

The goat hunting season should remain closed until it is established that the goat population is sufficient for a limited hunt. The fact that a population decrease was indicated during a period of no legal hunting suggests factors other than legal hunting may be responsible for less goats in this herd.

In the light of the possibly decreasing status of this goat herd, it would seem advisable to initiate a rather intensive study in an effort to determine the factors responsible.

Repeated aerial counts over this habitat should be made to determine the precision and accuracy of the aerial counting method as applied to goats in this area, as well as to more adequately census this mountain goat herd.

Table 1. Comparable Aerial Mountain Goat Census in the Bitterroot Unit

	Goats Observed	Air Time Over Goat Range	Minutes/Goat
1948	103	138	1.33
1950	85	94.5	1.11
1954	79	176	2.23

Table 2. Mountain Goat Census - May, 1954

Canyon	Air Time	Goats Observed	Air Time per Goat
One Horse	7	6	1.17
Sweeney	7	4	1.75
Bass	6	1	6.00
Kootenai	14	6	2.22
Big	17	10	1.70
Sweathouse	6	2	3.00
Bear	12	6	2.00
Fred Burr	9	5	1.80
Mill	9	2	4.50
Blodgett	15	6	2.50
Canyon	2	0	----
Sawtooth	16	1	16.00
Roaring Lion	7	6	1.17
Lost Horse	20	8	2.50
Rock	12	7 (one kid)	1.71
Tin Cup	6	3	2.00
Chaffin	3	0	----
Trapper	4	4	1.00
Boulder	4	2	2.00
	176	79	2.23

Table 3. Results of Counts Over Identical Habitat With a
Ten Day Interval Between Counts

	Goats Observed	Air Time Over Goat Range	Minutes/Goat
May 19	30	57	1.90
May 29	19	54	2.84

SUMMARY:

A decrease in the Bitterroot goat population was indicated by the trend count index. However, the trend count conditions may not have been comparable and further checking will be necessary to determine the herd status.

Prepared by:

Name Fred Hartkorn

Date June 15, 1954

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Approved by:

Name Merle J. Rogrud

STATE	Montana		
PROJECT NO.	W-60-R-1		
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VOL.	V	NO.	2

Title of Project: Western Montana Big Game Surveys

Leader Merle J. Rognrud

Job Completion Report Job No. VI-D Investigations Project

Title of Job: Study of Mountain Goat Winter Range Distribution

OBJECTIVES: Locate various bands of mountain goat and determine areas of wintering and the relationship of these areas to summer range.

TECHNIQUES USED:

During aerial elk census work in February and March, 1954, notes were taken of all goats seen and their location. Observations were also made of goat locations during aerial salting operations in late May and early June. An aerial reconnaissance on May 19 and 20 located goats in the upper South Fork of the Flathead River and the Mission Range.

FINDINGS: The following table lists the date, number of goats seen, location, approximate elevation and seasonal range occupied.

<u>Date</u>	<u>No. of Goats Seen</u>	<u>Location</u>	<u>Approx. Elev.</u>	<u>Seasonal Range</u>
5-19-54	2	Kid Mountain, S.F. Flathead	7,000	Summer
5-19-54	3	Youngs Cr. Cliffs, S.F. Flathead	6,000	Probably winter
5-19-54	3	S.F. Babcock Cr., " "	6,000	" "
3-16-54	3	Gyp Mountain, " "	7,000	Summer
3-16-54	1	Sappho Creek, " "	5,000	Probably winter
3-16-54	1	Kah Mountain, " "	6,300	" "
2-2-54	2	Hungry Mountain, " "	7,400	" "
3-16-54	1	Sergeant Mountain " "	6,000	Summer
3-16-54	1	Quintonkon, " "	5,000	Probably winter
3-4-54	19	Chair Mountain, M.F. Flathead	7,000	Summer
5-29-54	1	Trinity Mountain, " "	5,000	"
5-29-54	2	Mt. Penrose, " "	7,000	"
5-20-54	6	S.F. Mission Canyon, Mission Range	?	"
5-20-54	1	N.W. McDonald Peak, " "	?	"
5-20-54	1	S.E. of Mt. Harding, " "	?	"
5-20-54	2	Crow Creek, " "	?	Probably winter
5-20-54	5	Crow Creek, " "	?	" "
5-20-54	3	Cedar L.O., " "	?	Summer

Summer ranges of mountain goats are generally well known. However the location of many wintering grounds remains to be determined.

In some areas of western Montana, mountain goats apparently occupy separate summer and winter ranges while in other areas they occupy the same range, winter and summer.

Some of the wintering areas listed above are quite far removed from known summer range. Others, however, are adjacent to known summer range and may occasionally be occupied by goats during the summer.

Goat ranges are steep, rocky areas but seasonal variations in elevation apparently occur. The goat seen at Sappho Creek in March was near the bottom of Big Salmon canyon. Goats are known to range in the head of Sappho Creek during the summer season. Whether more than one goat occupied the winter area is not known, nor is it known whether goats are located on lower Sappho Creek each winter. More observations will be necessary to understand the local winter distribution of mountain goats.

RECOMMENDATIONS:

The accumulation of records of mountain goat winter distribution be continued.

SUMMARY:

During big game survey work in February and March, mountain goats were found occupying areas that were not occupied during the summer season, and some of these areas are very probably definite winter ranges of mountain goats.

Prepared by:

Name Phillip Marshall

Date June 20, 1954

Approved by:

Name Merle J. Rognrud

Approved by:

Montana State Department of Fish and Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana
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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. VII-A Investigations Project

Title of Job: Grizzly Bear Investigation and Recheck

OBJECTIVES:

1. Analyze data from the 1953 grizzly bear survey and compare with the results obtained from the 1941 survey in an attempt to secure a reliable population index for grizzly bear populations in Montana.
2. Analyze data from the Grizzly Bear Questionnaire returns to determine distribution and kill of grizzly bear in Montana.

TECHNIQUES USED:

Data from the field surveys of July-September 1953 (P-R Quarterly July-September 1953) was compared with the data from the 1941 surveys.

A Grizzly Bear Questionnaire and form letter (Figures 1 and 2) were sent to 252 individuals. Members of the United States Forest Service, the Montana Fish and Game Department, the Guides and Packers Association and various Montana Taxidermists received the questionnaire. As the questionnaires were returned, the location of sight records and kills of grizzly bear were plotted on a map of Western Montana.

PERSONNEL:

Personnel assigned to the grizzly bear work plan were D. S. Stockstad and P. B. Marshall, Junior Biologists, and Richard Fevold, Student Assistant. This report supplements the July-September, 1953 Quarterly progress report.

FINDINGS:

Analyses of the data from field surveys of 1953 (see Fig. 3, 4 and 5) indicated that the data could not be used as a population trend indicator when compared to the 1941 survey (Table I). Human use of the areas in which the surveys were

S T A T E O F M O N T A N A

DEPARTMENT OF

FISH AND GAME

Box 1138
Missoula, Montana
December 15, 1953

The Montana Fish and Game Department began a state-wide study of grizzly bear last summer. The main objectives of this study are to determine the numbers, distribution and kill of grizzly in Montana. To supplement our field work, we are asking you to send your observations on grizzly bear.

The enclosed questionnaire has been prepared for your convenience. Please report only authentic cases of grizzly bear seen or killed during 1953. Use the back of the questionnaire for any remarks or explanations that you may wish to contribute.

Montana has the largest grizzly bear population in the United States, but it is still the rarest of our big game animals. We need to learn more about this bear to insure his future in our state. Any information you can supply will be of value in the management of this species.

Your cooperation in the study of the grizzly bear will be appreciated.

The Montana Fish and Game Department

Figure 1. Letter Accompanying Grizzly Bear Questionnaire

GRIZZLY BEAR QUESTIONNAIRE

Grizzly Seen 1953

Use a separate line for each bear or group of bears.

[illegible]

Grizzly Killed 1953

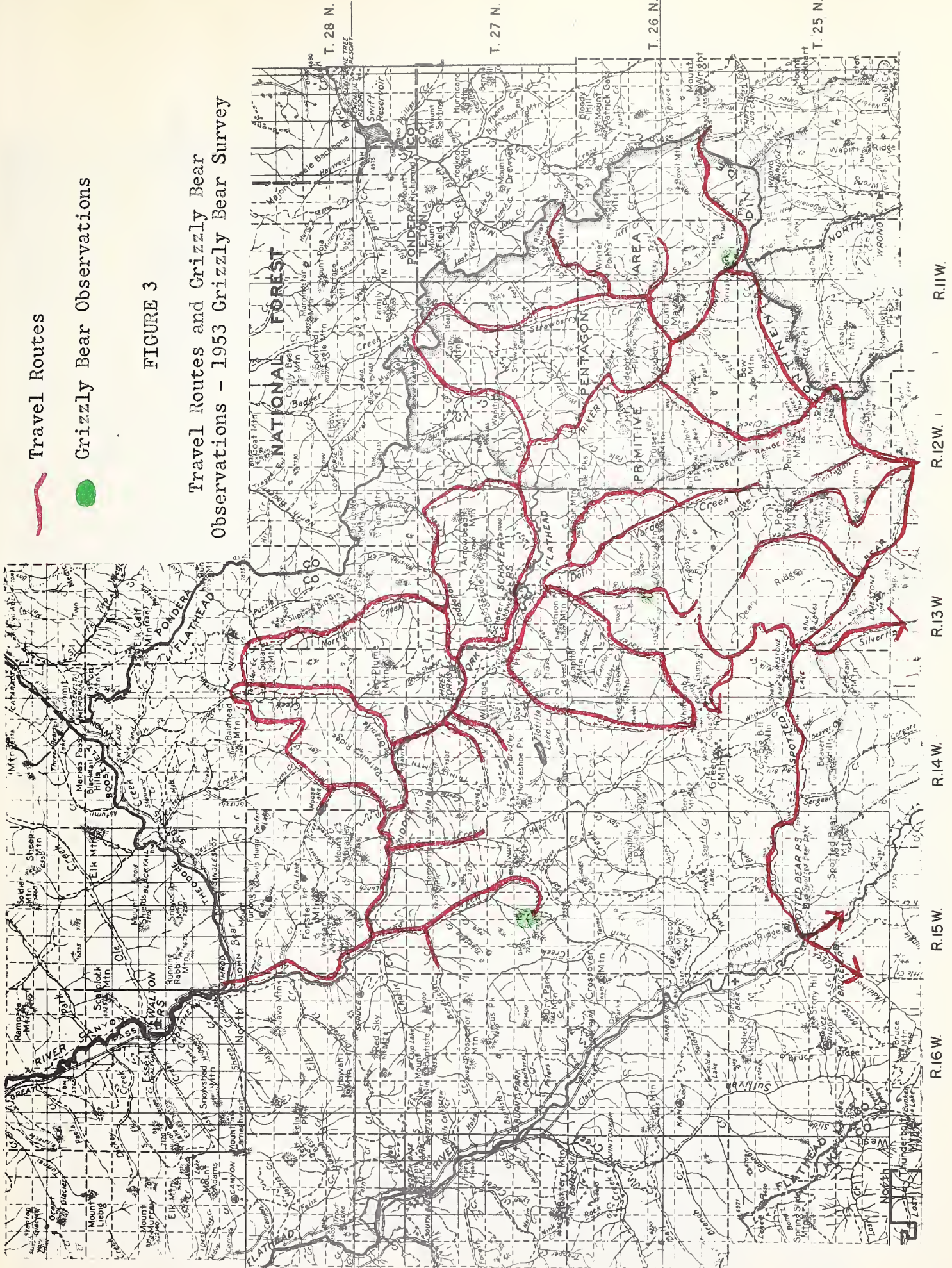
Use a separate line for each kill.

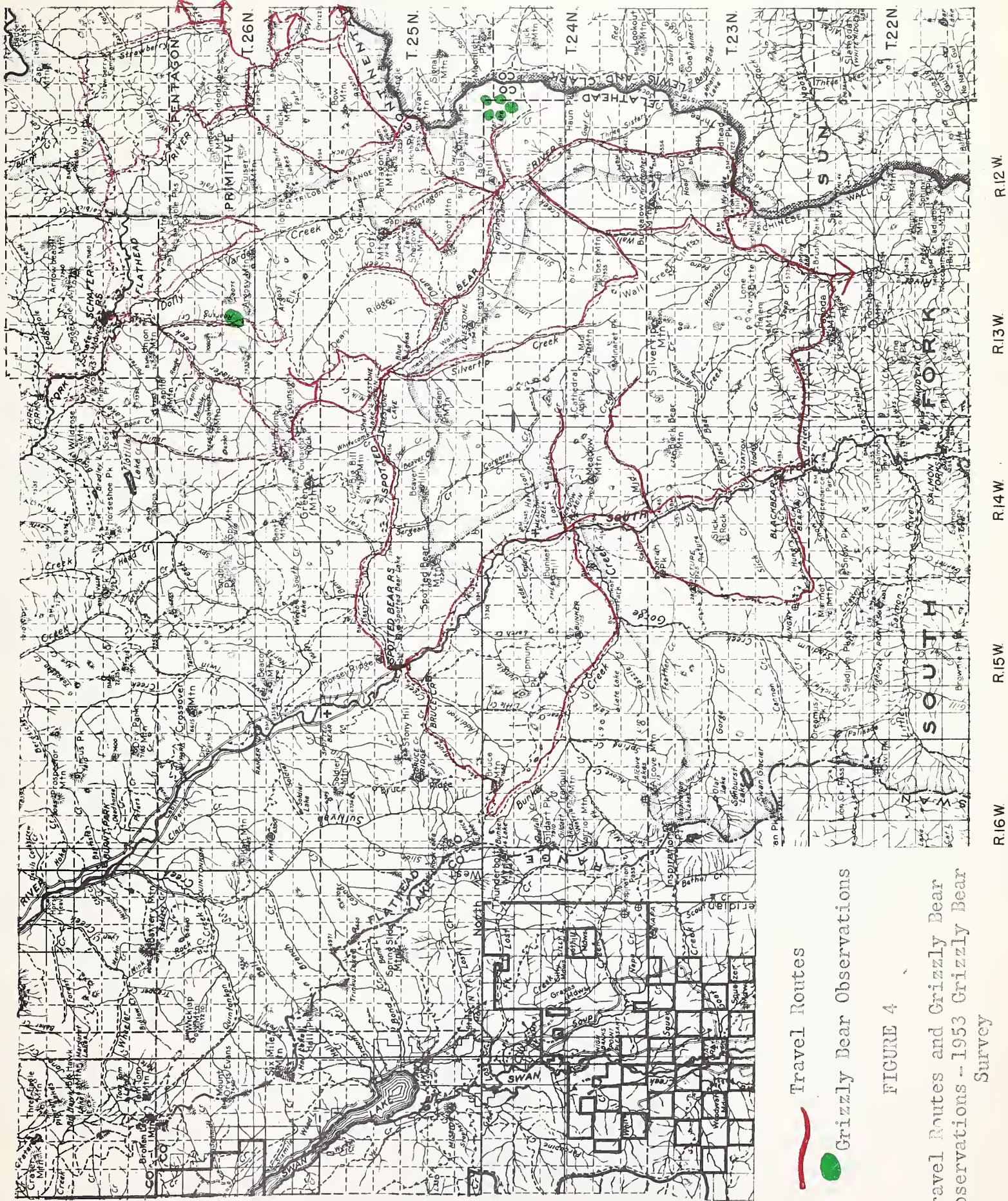
[illegible]

Reporter: _____

Note: Use back of sheet for remarks.

Figure 2.



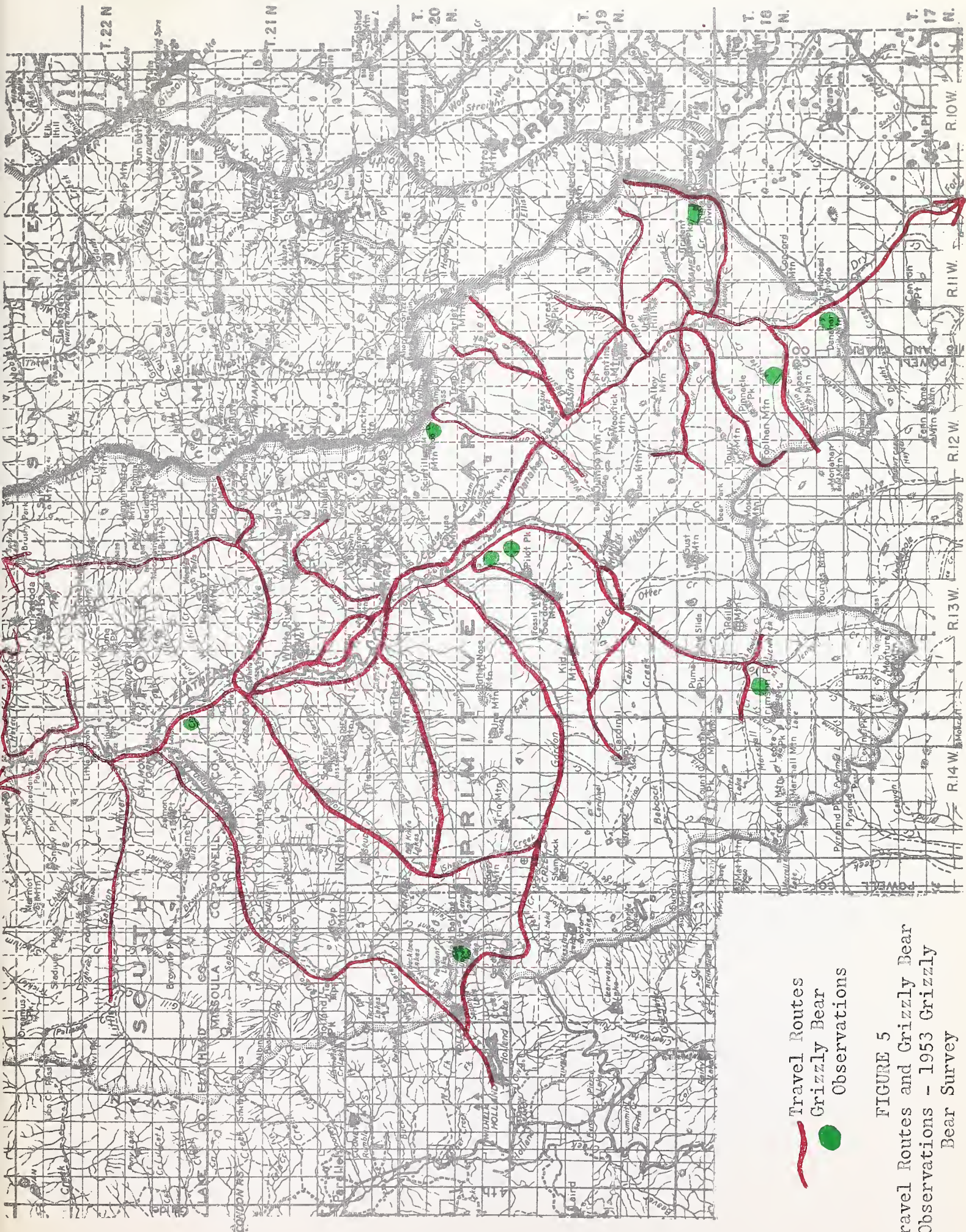


Travel Routes

Grizzly Bear Observations

FIGURE 4

Travel Routes and Grizzly Bear Observations - 1953 Grizzly Bear Survey



made has increased during this time and this alone makes comparison of the surveys difficult. Grizzly bears in wilderness areas are known to be shy of human activity and the heavy human use on the trails and camp sites has no doubt affected the grizzlies movements and distribution pattern.

Comparison of the data from the two surveys (Table I) would indicate that the grizzly has decreased almost five hundred percent in these areas in the intervening twelve years. Since such a decrease appears unlikely when the known kill records are examined and the general opinion of sportsmen, guides and outfitters, and Forest Service personnel, who feel that the grizzly is holding his own if not increasing, the method used in attempting to determine the population trend must be examined.

The results of the two surveys when the trails most heavily used by humans are excluded from both surveys remains much the same with the approximate five hundred percent decrease in grizzly numbers. This may be an indication that as human use of trails increases, grizzly use decreases and the number of tracks observed on trails of all types would therefore decrease accordingly.

Considering the above factors along with our lack of knowledge of grizzly bear movements, a comparison between the two surveys in an attempt to secure a reliable population trend indicator becomes impossible. However, as intensive studies further reveal information on the life history of the grizzly, this extensive data will assume increasing importance. At the present, this data should be useful in the study of food habits and the habitat preferences of the grizzly bear. The locations of grizzly bear seen and of tracks measured is given in Table II as a matter of record.

The percentage of Grizzly Bear Questionnaire returns from the various groups and organizations is given in Table III. The sight records and kills of grizzly obtained from these questionnaires are given in Table IV.

The information on kills can probably be accepted as an approximation of the grizzly kill for 1953 with the exception that the total number killed by predator control hunters and trappers and ranchers is not known. The distribution of kills is shown in Figure 6.

The sight records should be accepted with considerable reservation as under certain conditions even an experienced observer experiences difficulty in distinguishing between a black bear and a grizzly bear. The sight records should be used as an indication of grizzly bear distribution and should not be interpreted as representing grizzly bear numbers or density in a given area. The number of observers and the

TABLE I.

Comparison of 1941 and 1953 Grizzly Surveys in the FlatheadNational Forest

	<u>1941</u>	<u>1953</u>
Number in Entire Area	58	17
Miles of Travel	1,109	1,531
Miles of Travel/Observation	19.1	90.1
Hours of Travel/Observation	-----	35.1
Number Inside Bear Preserve	14	2
Miles of Travel	301	260
Miles of Travel/Observation	21.5	130
Hours of Travel/Observation	-----	54.5
Number Outside Bear Preserve	44	15
Miles of Travel	808	1271
Miles of Travel/Observation	18.4	84.7
Hours of Travel/Observation	-----	32.6
Number in Middle Fork Drainage	16	3
Miles of Travel	396	405
Miles of Travel/Observation	24.7	135
Hours of Travel/Observation	-----	44.3
Number in South Fork Drainage	42	14
Miles of Travel	713	1126
Miles of Travel/Observation	17.0	84.3
Hours of Travel/Observation	-----	33.2

TABLE II.

GRIZZLY BEAR OBSERVATIONS 1953 SURVEYFLATHEAD NATIONAL FOREST

Date	Location	Track Measurements			
		Front		Hind	
		Width	Length	Width	Length
7-16-53	Dry Fork - Danaher Divide	$6\frac{1}{2}$	5	-	-
7-18-53	2 Mi. up Limestone Creek Trail	$3\frac{1}{2}$	$2\frac{1}{2}$	-	-
7-18-53	Cont. Divide near Triple Divide	5	$4\frac{1}{2}$	5	8
7-20-53	Head of Camp Creek	5	$5\frac{1}{2}$	-	-
7-22-53	6 Mi. from Big Prairie R.S. on Trail #125	$3\frac{1}{2}$	$2\frac{1}{2}$	-	-
7-23-53	7 Mi. from Hahn R.S. on Trail #141	3	4	-	-
8-17-53	Hart Lake	-	-	7	$11\frac{1}{2}$
8-17-53	" "	6	$6\frac{1}{2}$	$6\frac{1}{2}$	10
8-17-53	" "	$5\frac{1}{2}$	5	5	10
8-17-53	" "	5	$4\frac{1}{2}$	5	$8\frac{1}{2}$
8-17-53	" "	$3\frac{1}{4}$	3	3	4
8-21-53	8 Mi. from Gooseberry Park on Trail #163	5	$4\frac{1}{2}$	-	-
8-23-53	Argosy Mountain	Sight Record			
8-30-53	Head of Long Creek	4	$4\frac{1}{2}$	-	-
9-16-53	3 Mi. above Salmon Fks. on Trail #80	$5\frac{1}{2}$	5	$5\frac{1}{2}$	10
9-24-53	Mouth of Youngs Cr. on Trail #141	$5\frac{1}{2}$	$6\frac{1}{2}$	5	$10\frac{1}{2}$
9-26-53	Upper Holland Lake	-	-	5	$7\frac{1}{2}$

TABLE III.

1953 GRIZZLY BEAR QUESTIONNAIRE DATA

Agency or Group	<u>No. Sent</u>	<u>No. Returned</u>	<u>Percentage Returned</u>
United States Forest Service	50	50	100
Montana Taxidermists	16	11	68.7
Montana Fish and Game Department	41	30	73.2
Guides and Outfitters	<u>145</u>	<u>86</u>	<u>59.3</u>
TOTALS	252	177	70.2

TABLE IV.

GRIZZLY BEAR KILLS AND SIGHT RECORDS BY MANAGEMENT UNITS1953

<u>Management Unit</u>	<u>No. Sight Records</u>	<u>No. Kills</u>
Flathead-Sun River	94	12
Kalispell	18	7
Absaroka	12	0
Kootenai	12	2
Ennis-Hebgen	8	4
Blackfoot	7	1
Bitterroot	5	0
Gallatin	4	0
Deer Lodge	3	0
Clark Fork	2	2
Blackfoot Indian Reservation	<u>0</u>	<u>4</u>
TOTALS	165	32

time spent in an area may result in a large variation of sight records in areas of equal grizzly populations. It is also probable that a large number of duplicate sight records on the same bears were reported. The sight records should prove valuable however in selecting an area in which intensive studies can be made.

RECOMMENDATIONS:

A Grizzly Bear Questionnaire should be continued next year and provisions made whereby the number of observers and days of observation in an area can be obtained. The kill of grizzly bear by predator control agents and ranchers should also be determined.

Additional extensive studies for the purpose of determining a population trend are not recommended until an intensive study in a limited area is conducted to obtain information which can be applied in evaluating the extensive data. This intensive study should attempt to obtain the productivity, range, territory and general life history data of the grizzly bear by predator control agents and ranchers should also be determined.

Additional extensive studies for the purpose of determining a population trend are not recommended until an intensive study in a limited area is conducted to obtain information which can be applied in evaluating the extensive data. This intensive study should attempt to obtain the productivity, range, territory and general life history data of the grizzly bear in the wild state and with this information endeavor to fill the niches that exist in the life equation of the grizzly bear. If the grizzly bear is to remain as one of Montana's top trophies this information must be obtained as efficient management of this species is impossible without it.

SUMMARY:

Comparison of the data from the 1941 and 1953 grizzly bear surveys indicates that the grizzly population in the study area has decreased almost five hundred percent over this 12 year period. Since such a decrease appears unlikely in view of reports from guides and packers and U. S. Forest Service personnel, the method of determining the population trend was questioned. Examination of the survey methods indicated that numerous factors could influence the results obtained in a survey of this type. Additional extensive surveys are not recommended until an intensive study furnishes more detailed information for use in interpreting the results from the extensive surveys.

A Grizzly Bear Questionnaire was sent to 252 individuals from various cooperating agencies. The results from this questionnaire gave indications as to the number and distribution of grizzly bear in Montana as well as an estimation

of the legal grizzly kill for 1953. Thirty-two grizzlies were reported killed and this number is believed to be a close approximation of the actual legal kill. The sight records from the questionnaire were accepted with reservations and were used only to give an indication of the actual numbers and distribution of grizzly bear.

A Grizzly Bear Questionnaire is recommended for 1954 providing a means can be found to obtain the kill by sheep herders, cattlemen, and predator control agents. Provisions should also be made to relate the number of grizzly observed to the number of observations in each area.

Prepared by:

Name D. S. Stockstad

Date June 15, 1954

Approved by:

Name M. J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish & Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-60-R-1
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. VIII-A Investigations Project

Title of Job: Supervisor Aerial Salting in Western Montana Game Units

The work was carried out as scheduled and reported under
project 26-M in the October-December, 1953 Quarterly
Report.

Prepared by:

Name Merle J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish & Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-60-R-1
DATE July 15, 1954
VOL. V NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. IX-A Investigations Project

Title of Job. Characteristics of Natural Licks used by Wildlife in Montana

Except for the collection of natural lick samples and further accumulation of information on locations of natural licks in western Montana no work was done on this work plan during the project period.

Prepared by:

Name Merle J. Rognrud

Date June 20, 1954

Approved by:

Montana State Department of Fish & Game

By: Faye M. Couey, Assistant Director

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-5-D-12
DATE	July 15, 1954
VOL	V NO. 2

FINAL REPORT FOR
DEVELOPMENT PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: General Wildlife Restocking Project
2. Leader: James McLucas, Fieldman
3. Report of Progress:

MOUNTAIN GOAT TRAPPING AND TRANSPLANTING

DATES: July 1, 1953 to June 30, 1954

PERSONNEL: James McLucas, Project Leader
Earl Andridge, Junior Fieldman

TRAPPING AREAS:

1. South Fork of Flathead, Flathead County
2. Trapper Creek-Canyon Creek Area
(Pioneer Range, Beaverhead County)

RELEASE SITES:

1. East Rosebud Canyon
Beartooth Plateau, Carbon County
2. Big Snowy Range, Fergus County

PURPOSE:

The trapping and transplanting of mountain goats has represented a very important phase of Montana's big game development program for the past several years as aided by Wildlife Restoration funds. This important species was originally found only along the Continental Divide and on the ranges to the west.

In this State excellent habitat has been located on the various ranges east of the Continental Divide. Several areas have been successfully planted. The Crazy Mountain range represents the most outstanding as it has been possible to harvest a small number by a carefully planned hunt in that area last year. Several additional areas need goats to assure establishment. Among these are the Beartooth Plateau (East Rosebud Canyon) in Carbon County and the Big Snowy Mountain Range in Fergus County.

The following chart indicates mountain goats planted in these areas during the reporting period:

Ear Tag*	Sex	Age	Trapped	Release Area	Date
E-1108					
406	Nanny	Mature	S.F. Flathead	East Rosebud Canyon	7-14-53
407-405	Nanny	Mature	"	"	"
403-404	Nanny	Kid	"	"	"
328-350	Billy	Yearling	Canyon Creek	Snowy Mountains	8-20-53
327-396	Billy	Kid	"	"	"
393-329	Nanny	Yearling	"	"	"
376-392	Nanny	Mature	"	"	"
383-346	Billy	Kid	"	"	"
390-371	Nanny	Mature	"	"	8-22-53
394-389	Billy	Kid	"	"	"
386-391	Nanny	Mature	"	"	"
339-397	Billy	Kid	"	"	"
333-398	Nanny	Kid	"	"	"

* These goats reported in the Montana Quarterly Report, July-September, 1953

MOUNTAIN SHEEP TRAPPING AND TRANSPLANTING

DATES: June 1 to June 17, 1954

PERSONNEL: James McLucas, Project Leader
Earl Andridge, Junior Fieldman

TRAPPING AREA:

Upper Gibson Lake - Sun River Canyon (Scattering Springs trap)

RELEASE SITE:

Sixteen Mile Creek, Maudlow area - Northern Gallatin County

PURPOSE:

Although once one of the most abundant of the big game species in Montana, the mountain sheep were drastically reduced in numbers by indiscriminate hunting and possible effects of disease and parasites. Restoration has been extremely slow. It appears that plantings made in desirable areas throughout the State will undoubtedly represent one of the best methods of bringing back this extremely desirable big game species. As the base stock is small, trapping activities are relatively difficult. It is expected therefore that this phase of big game development will extend over several more years.

It has been determined that where large blocks of habitat are encountered within a planting site, a release pasture is extremely desirable. If, however, the release site is somewhat limited in size representing an island of habitat, it is felt that the cost of such a pasture would not in that case be justified. It was felt that the Sixteen Mile site described in this report falls into the category of 'island' type release.

The Sixteen Mile Canyon indicates a history of mountain sheep abundance many years ago. None have been seen in this area, however, during the past forty to fifty years. The area lies outside of the Helena and Gallatin National Forests. However, private ownership is extremely interested in the re-establishment of mountain sheep in that area. It is expected that local ranchers will aid very materially in the protection of this species.

The following table indicates the date of release, as well as the age and sex of the various animals liberated:

Ear Tag	Sex	Age	Trapped	Release Area	Date
501	Ram	Yearling	Sun River Canyon	Sixteen Mile Canyon	6-18-54
502	Ewe	Mature	"	"	"
503	Ram	Yearling	"	"	"
505	Ram	Lamb	"	"	"
507	Ewe	Mature	"	"	"
521	Ewe	Yearling	"	"	"

PREDATORY CONTROL PROGRAM

DATES: February 1, 1954 to March 31, 1954

PERSONNEL: James McLucas

PURPOSE:

The objective of this project was to control coyote predation on and adjacent to the mountain sheep range in the Sun River Canyon, and to check on the success of the previous year's operation.

The secondary objective was to study the movement of mountain sheep and other big game animals in this area and their relationship to the above-named predator.

Control of mountain lions, bobcats and golden eagles was incidental to the project. .

PROCEDURE:

The first phase of this project was spent gathering equipment--cyanide guns, traps, scent, etc., and moving supplies into the cabins to be used in this area.

This project was carried out as the year previous with the exceptions of the time spent which was thirty days less and the North and South Fork of the Sun River was not in the control area due to the severe snow conditions and the predators moving into the lower Sun River area.

A decided decrease in the coyote population was noted in the control area and an increase appeared in the yearling mountain sheep population which had been lacking

in previous years. This increase could not be credited to the predator control program, but after the previous year of work removing predators from this mountain sheep area, young sheep and other species of game animals in the area seem to have been helped.

The following table will show the increase or decrease of predators taken in the following areas:

Coyotes		
	1953	1954
Blacktail	2	2
Big George	20	19
Hannan Gulch	8	2
Mortimer Creek	7	3
North Fork Sun River	13	*
South Fork Sun River	22	*
Scattering Springs	11	6
Sheep Trap	8	7
Reclamation Flat	9	2
Wagner Basin	3	1
Willow Creek	<u>15</u>	<u>10</u>
Total	118	52

* Not trapped, 1954

Mountain Lions		
	1953	1954
Beaver Creek	7	0
Sun River	2	0
Leavitt Creek	1	0
Wood Creek	<u>0</u>	<u>4</u>
Total	10	4

Eagles

	1953	1954
South Fork Sun River	5	*
North Fork Sun River	2	*
Big George	4	3
Scattering Springs	1	0
Lower Sun River	<u>3</u>	<u>6</u>
Total	15	9

* Not trapped, 1954

RECOMMENDATIONS:

It is felt that a check of this area should be made next winter to judge the results of the last two years' work. Observations made this coming winter would be of extreme importance in making a more complete evaluation of the program carried on the last two years.

Submitted by:

Name James McLucas

Title Fieldman

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Date July 15, 1954

STATE Montana
PROJECT NO. W-33-D-5
DATE July 15, 1954
VOL. V NO. 2

FINAL REPORT FOR
DEVELOPMENT PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title: Blackfoot-Clearwater Winter Big Game Range Development
2. Personnel: Wesley Woodgerd, Biologist, Project Leader
Jack Ray, Junior Fieldman
3. Completion report:

A. BUILDINGS

A new metal hay shed was constructed by contract and the old hay storage shed was torn down. The usable parts were salvaged and the remainder destroyed.

The proposed airplane hangar was not constructed due to the press of other necessary jobs. A small shed was built to house a 500 gallon gasoline storage tank, oil, tie down ropes, etc. Cable tie downs were placed on the edge of the landing strip.

B. FENCE CONSTRUCTION

Twelve and one-quarter miles of new boundary fence was constructed under contract. The old fence was removed and the parts were either salvaged or destroyed. Two and three-quarter miles of new fence was constructed by force account.

C. CORRAL

A round corral was constructed near the horse barn to facilitate the handling of saddle and pack stock.

D. EQUIPMENT

Equipment purchased under this project includes:

Weed sprayer attachment for tractor
Power mower attachment for tractor
Angle blade and ditcher attachment for tractor
Cultivator attachment for tractor
Plow attachment for tractor
One man chain saw
Truck, 1½ ton with hydraulic lift and stock rack
Truck, pickup, ½ ton

Submitted by:

Name Wesley Woodgerd

Title Project Leader

Approved by:

Montana State Department of Fish and Game

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Date July 15, 1954

STATE Montana
PROJECT NO. W-45-M-3
DATE July 15, 1954
VOL. V NO. 2

FINAL REPORT FOR
MAINTENANCE PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Maintenance of Blackfoot-Clearwater Big Game Range
2. Personnel: Wesley Woodgerd, Biologist, Project Leader
Jack Ray, Junior Fieldman
3. Completion Report:

A. BUILDINGS

The ceiling of the second floor of the bunkhouse was insulated with Zonalite. The porch on the manager's residence was closed in and the ceiling replaced. The attic of this building was also insulated with Zonalite.

B. CANALS AND DITCHES

The entire ditch system was cleaned and repaired. New headgates were installed where necessary. The rebuilding of 5,800 feet of washed-out ditch was not done. The wet ground would not support the necessary machinery and a headgate was constructed that eliminated the necessity of this ditch.

C. BRIDGES

Two bridges on the headquarters entrance road were repaired.

D. ROADS

The interior roads were graded to facilitate travel and for use as fire breaks. The snow was plowed throughout the winter for access and to facilitate carrying on the elk feeding experiment and the elk

tagging operations.

E. FENCES

The entire boundary fence was repaired and parts replaced when necessary to keep trespass stock from the game range.

F. NOXIOUS WEED CONTROL

The chemical spray control of leafy spurge was found to be less effective than desired, and the main portion of the infestation is now being cultivated to kill the weeds. An intensive spray program is being carried out on the spot infestations, and along the fence rows.

The goatweed in the Clearwater drainage was sprayed.

G. GAME BAITING

Two bait lines were maintained on the game range during the winter months to encourage elk to stay on the range and off surrounding private property. The bait line was also used to lure the elk into a trap. (See completion report under W-60-R-1, April-June, 1954, Pittman-Robertson Quarterly)

H. AIRSTRIP MAINTENANCE

Maintenance work done on the airstrip included rock picking, rolling and weed control. Snow was plowed for access during the winter.

I. MISCELLANEOUS ACTIVITIES

These activities include maintenance and repair of equipment, distribution of hay, general upkeep of the buildings, and necessary census and patrol work.

Submitted by:

Approved by:

Name Wesley Woodgerd

Montana State Department of Fish and Game

Title Project Leader

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Date July 15, 1954

